MINNESOTA
VARIETAL TRIALS RESULTS

IP 116-2010 January 2010

lfalfa, Barley, Birdsfoot Trefoil, Canola,
orn Grain, Corn Silage, Kura Clover,
at, Orchardgrass, Red Clover, Soybean,
pring Wheat, Winter Wheat and Wildrice

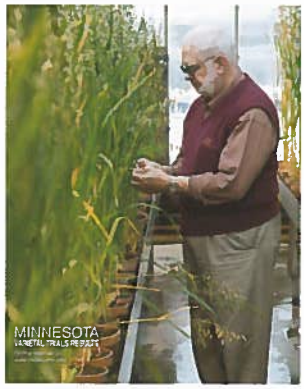
Minnesota Agricultural
Experiment Station

UNIVERSITY OF MINNESOTA

Driven to Discover℠

CONTENTS

Cover
"The value of clover as a farm crop is so well known that little need be said by way of introduction as to the importance of the clover crop." So wrote Harry Snyder in the1894 Report of the Minnesota Agricultural Experiment Station. While alfalfa eventually became the state's leading forage legume, medium red clover remains a useful farm crop in Minnesota.



Outside back cover
Dr. Deon Stuthman retired in 2009 after 42 years of oat breeding and improvement at the Minnesota Agricultural Experiment station. In his time the Station released 18 new oat varieties. Dr. Stuthman also has been active in an international oat-breeding program, whose efforts include development of oat varieties with stem rust resistance for Mexico.

Minnesota
VARIETAL TRIALS RESULTS

To help growers select varieties best adapted to a specific area, the Minnesota Agricultural Experiment Station (MAES) compares varieties in trial plots at St. Paul, Becker, Crookston, Grand Rapids, Lamberton, Morris and Waseca, and in farmers' fields. Crop varieties are grown in replicated plots at each location, and factors affecting their yield and characteristics are as nearly the same as possible for all varieties at each location.

Not all crop varieties included in previous editions of Minnesota Varietal Trials are included in this 2010 edition. If you have a question about such a crop, contact the author(s) of the related crop section at 612-625-2740 or go to the MAES web site at www.maes.umn.edu. Click on Commodity/Crop Lines, then on Varietal Trials, which will display a crop listing.

Certified Seed

Use of certified seed is suggested, but certification in itself does not imply recommendation. Registered and certified seed of most varieties described in this report can be purchased from seed dealers or grower-members of the Minnesota Crop Improvement Association (MCIA). You can find sources of certified and registered seed at the MCIA web site, www.mcia.org.

Interpreting the Tables

The LSD (least significant difference) numbers beneath yield columns in tables are statistical measures of variability within trials. The LSD is used to determine whether the difference between two yields is due to a genetic difference in the varieties or to other causes, such as environmental variability.

If the yield difference between two varieties equals or exceeds the LSD value for the yield column, the higher-yielding variety probably was superior in yield. If the difference is less than the LSD the yield difference probably was due to environmental factors. An "NS" notation in a column indicates no significant difference for that characteristic. The relative maturities of varieties are variously indicated in the tables as date of maturity; date of heading or blooming; days to maturity, heading or blooming; or moisture percentage at harvest.

These varietal trials are not designed for crop (species) comparisons; crops are grown on different fields and with different management. The data should be used only to compare varieties within a table.

Abbreviations

To save space in variety descriptions and some other listings, "agricultural experiment station" often is abbreviated as AES.

Cooperating Researchers

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Minnesota Agricultural Experiment Station

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Beverly R. Durgan

Dear Minnesota Growers,

Plant variety adaptation and yield are important. That fact was reinforced for me while attending the University's memorial service for Norman Borlaug, its graduate who received the 1970 Nobel Peace Prize for his work to combat world hunger.

The foundation of Borlaug's effort was to develop high-yield, drought-resistant varieties of wheat. But Borlaug did more than just develop wheat adapted to countries desperately in need of increased food production. He developed teams of agricultural scientists who taught the small farmers of Mexico, Pakistan and India how to grow that wheat. Borlaug's work is calculated to have saved some two billion lives worldwide.

Norman Borlaug is a role model for those of us who work for land grant colleges and universities. Borlaug's new dwarf wheat variety was a research discovery. He created a food production miracle when he combined new wheat varieties with extension outreach on how to grow them, changing and saving lives in the process. Borlaug was a strong advocate for agricultural research and the importance of sharing its results to increase production, reduce hunger and starvation and, hopefully, to help increase world peace.

It is appropriate to remember Norman Borlaug's life work as University of Minnesota Extension observes its centennial this year. Since 1909, Extension has connected people's needs and University resources to improve the lives and communities of Minnesotans. The partnership between the Agricultural Experiment Station, as it developed new crop varieties and improved crop and livestock production practices, and the Extension Service, which brought this research information to farm families and showed them how to apply it, has been of inestimable value to the people of Minnesota.

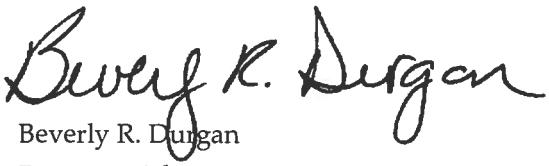
The work begun a century ago continues. The Experiment Station's plant variety programs are as important today as when its first crop varieties were released in the 1890s. This publication is about helping you make decisions about crop varieties that will increase profitability on your farm. The varietal trials results in this booklet are part of a larger program focused on finding the best crop varieties that thrive in Minnesota, helping to build our economy and contributing to our quality of life.

The University of Minnesota plant breeding and genetics program has three goals:

1. Discovering new knowledge about plant breeding and plant genetics;
2. Educating graduate and undergraduate students; and
3. Developing plant germplasm, genetic stocks and varieties.

Minnesota agriculture faced many challenges during 2009. The weather, livestock prices and the general economy created stress for many farm families. We will get through this troubled time the same way Minnesota agriculture always gets through problems — by working together in partnerships and helping each other.

History has many examples of farmers, farm organizations, the University of Minnesota and state and federal agencies working to improve Minnesota agriculture. Those partnerships produced answers for many of the challenges Minnesota agriculture faced in the past and will face again in the future. The University of Minnesota is committed to providing the answers growers need when making decisions today and to long-term research to deal with the challenges that will come in the future.



Beverly R. Durgan
Director of the Minnesota Agricultural Experiment Station
Dean of the University of Minnesota Extension Service

Minnesota Agricultural Experiment Station
UNIVERSITY OF MINNESOTA

Varietal Trials Results

January 2010

Alfalfa

Craig Sheaffer and Joshua Larson

Yield is the single largest determinant of economic return per acre for alfalfa production. Selecting alfalfa varieties with high yield potential is fundamental to obtaining high yields. The yield advantage realized with good alfalfa varieties quickly trivializes their greater seed cost.

Yield potential of alfalfa varieties is evaluated in research trials at University of Minnesota Research and Outreach Centers and on cooperating farmers' fields. The trials are conducted using recommended fertility and pest control practices to optimize alfalfa yield and persistence.

Yield performance of tested varieties is presented as a percentage of check variety yields (average for Vernal, Oneida VR, and 5312). Test locations are in alfalfa production regions with different winter injury risk. They include Rosemount (Dakota Co.), Zumbro Falls (Wabasha Co.), Lamberton (Redwood Co.), St. Martin and Richmond (Stearns Co.), Underwood (Otter Tail Co.) and Grand Rapids (Itasca Co.). In addition, some alfalfa varieties are tested for forage quality at Rosemount.

Locations of alfalfa trials.

Yield results for alfalfa varieties tested in current Minnesota yield trials (2006 to 2009 seeding years) are listed in Tables 1 through 5. Varieties in the current forage quality trial are listed in Table 6. Alfalfa variety seed marketers and matching web sites are provided in Table 7. Disease resistance information for alfalfa varieties is available on the web at www.alfalfa.org.

Winterhardiness and Winter Survival Index

Severe winters make winter hardiness a primary consideration in variety selection for most areas of Minnesota. Winterhardiness of varieties is difficult to determine because winter injury can occur as a result of weather events that cause varied responses in alfalfa plants of differing ages.

The best indicator of winter survival potential is the yield performance in the third production year after seeding. Fall dormancy rating, sometimes an indicator of winter survival potential, is available at www.alfalfa.org.

When selecting alfalfa varieties for your farm, greatest winterhardiness is needed in west central and northwestern Minnesota (see winter injury potential map). East central and southeastern Minnesota also experience severe winters frequently. Southwestern Minnesota seldom experiences severe winter injury because of dry soils, high soil potassium levels and neutral soil pH. Because of dependable snow cover, Northeastern Minnesota seldom experiences severe winter injury.

Winter injury potential.

Forage Yield

Yield results for alfalfa varieties tested in current Minnesota trials are presented in Tables 1 to 5. Yields for many entries in 2009 were reduced because of a summer drought. Yields are expressed as a percentage of check variety yields; for example, '113' means the variety had 13% greater yield than the average of the check varieties. Within each table, varieties are ranked according to their average performance across ALL current trials in which they have been tested (2006 to 2008 seedings). Individual tables correspond to test results from different regions of Minnesota.

Greatest confidence should be placed in variety yield information that represents six or more site-years of testing (e.g. two years of yield data at each of three test sites). Each variety in the yield result tables has been formatted to reveal how many site-years of MN yield data have been collected. Varieties appearing in **bold** type have been tested in six or more site-years.

Varietal yield difference tends to increase with stand age. Thus, to choose a variety for short-term stands, consider yield performance the first and second years after seeding (e.g. yield performance in 2007 and 2008 for a 2006 seeding). For long-term stands, choose varieties based on their performance through the third year after seeding (e.g. 2009 yield for 2006 seeding).

Forage Quality

While maturity is the greatest determinant of forage quality or feeding value of alfalfa, varieties also genetically differ in forage quality potential. Forage quality of alfalfa varieties in tests seeded in 2008 (four harvests) and 2009 (two harvests) in Minnesota are shown in Table 6a and 6b respectively. Production year evaluation (first year after seeding) was done by analyzing each of four cuttings taken at late bud to 1/10-bloom stages of maturity. Data are expressed as milk per ton of forage, milk per acre and relative forage quality (RFQ).

Milk per ton is calculated based on MILK2006 and combines crude protein, neutral detergent fiber (NDF), and NDF digestibility to predict milk production per ton of forage DM. In MILK2006, the intake of energy from forage for a 1,350-pound milking cow consuming a 30% NDF diet is calculated, and the cow's maintenance energy requirement then subtracted from energy intake to provide an estimate of energy available from forage for conversion to milk. Forage DM yield multiplied by milk per ton of forage DM provides an estimate of milk produced per acre and combines yield and quality into a single term. For a technical discussion of NDFD and Milk2006, see: http://www.uwex.edu/ces/forage/articles.htm#milk2000.

Relative forage quality (RFQ) is an index with similar average and range as RFV but it includes NDF digestibility in estimates of DMI and TDN to calculate RFQ. For a technical discussion of RFQ, see: www.uwex.edu/ces/crops/uwforage/RFQvsRFV.htm.

Potato Leafhopper Tolerance

Potato leafhoppers (PLH) are usually the most damaging insect pest of alfalfa in Minnesota. Some alfalfa varieties have tolerance via inhibited PLH population growth and higher economic thresholds. Alfalfa varieties with greater than 50% resistance to PLH have an economic threshold three times higher than conventional varieties. Variety resistance to potato leaf hopper is available at www.alfalfa.org.

Despite their potential for significant damage, PLH are not a problem in every harvest, year and region of Minnesota. PLH pressure is more consistent south and east of Minnesota.

Disease Resistance

Alfalfa root and crown diseases occur in most Minnesota soils. The most important diseases are Bacterial wilt, Phytophthora root rot, Fusarium wilt, Anthracnose, Verticillium wilt, and Aphanomyces root rot (races 1 and 2). Plant resistance for all six diseases is widely available, except for Aphanomyces race 2 for which only a few, but a growing number of, varieties have known resistance. Variety resistance ratings for each disease are available on the web at www.alfalfa.org. Brown root rot is known to be present in Minnesota soils, but varietal resistance is currently unknown. While moderate resistance (MR) to a disease will provide protection to a variety under most conditions, either resistance (R) or high resistance (HR) is required for protection under severe disease conditions.

Winter injury can be the result of a combination of injury from cold temperatures and from root and crown diseases. Under some conditions, disease resistances can compensate for lesser levels of cold tolerance. While all varieties can benefit from improved disease resistance, it is especially important that varieties with less than Very Good (2.0) WSI have at least (R) levels of disease resistance to produce more than two years after the seeding year under intensive management four cuts/season) in the east central and southeastern areas of Minnesota.

Blends

Many companies sell blends, a mixture of two or more varieties, at a reduced price from named varieties. Blends may perform as well as the best varieties or may do very poorly. Disease resistance, yield, winter survival, and other characteristics may change within a blend from lot to lot or year to year as blend composition changes. Planting *certified* seed of adapted, high-yielding varieties best assures trueness to name.

Table 1. Alfalfa variety yield as percentage of check varieties at Rosemount (Dakota County).

		Rosemount			
		2007 Seeding			2008 seeding
Variety[1]	Marketer	2009	2008	2-Year Total	1-Year Total
4S417	Mycogen	—	—	—	118
HYBRIFORCE-2400	DairyLand	—	—	—	113
FSG 406	La Crosse	118	108	113	—
DKA43-13	Dekalb	—	—	—	108
FOREMOST II	Prairie	111	112	111	—
PHABULOUS III	Trelay Inc.	116	111	113	—
LIGHTNING IV	Jung	—	—	—	107
AMERISTAND 407TQ	**Am.Alf**	**101**	**109**	**106**	**106**
6431	Garst	—	—	—	104
VELOCITY	**NuTech**	—	—	—	**114**
SPRINGGOLD	Renk	111	108	109	—
6417	**Garst**	**112**	**106**	**109**	**106**
55V48	**Pioneer**	**117**	**110**	**113**	**108**
6415	Garst	—	—	—	103
LEGEND EXTRA	Legend	—	—	—	102
6426	Garst	110	106	108	—
CIMARRON	Great Plains	111	104	107	103
WL 322HQ	W-L	110	104	106	98
5312(check)	Pioneer	103	105	104	102
VERNAL(check)	Public	98	100	99	100
ONEIDA VR(check)	Public	99	94	96	99
Checks, tons/acre as hay		*4.7*	*6.1*	*10.8*	*6.0*
LSD (5%)		15	9	10	8

[1] Varieties are ranked according to their performance across all current trials. Bold varieties have been in Minnesota trials for more than 5 site-years.

For the web version of this report go to the Minnesota Agricultural Experiment Station website URL, www.maes.umn.edu/pubs.html

More detailed alfalfa variety performance results are available on the UM-Agronomy FORAGES website, http://www.extension.umn.edu/forages/

Test Plot Research

Test plot establishment and management were supervised by Joshua Larson together with Russ Mathison, Steve Quiring and Doug Holen.

Alfalfa Planting Rate and Date

Bushel Weight, Pounds.....60

Seeds/Pound..... 220,000

Planting Rate, Pounds/Acre

Alone.....13

With Grass..... 5-10

Planting Rate, Seeds/Sq.Ft.

Alone.....65

With Grass..... 25-50

Planting Date...Late April–Early May or Late July-Early August

Table 2. Alfalfa variety yield as percentage of check varieties at Zumbro Falls (Wabasha County) and Lamberton (Redwood County).

		Zumbro Falls					Lamberton		
		2006 Seeding				2008 seeding	2007 Seeding		
Variety[1]	Marketer	2009	2008	2007	3-Year Total	1-Year Total	2009	2008	2-Year Total
L447HD	Legacy	110	118	112	114	—	—	—	—
54V46	Pioneer	140	124	106	118	—	—	—	—
DKA41-18RR	Dekalb	128	116	106	113	—	—	—	—
DKA43-13	Dekalb	—	—	—	—	116	—	—	—
MAGNUM VI	Dairyland	135	115	107	115	—	—	—	—
GH727	Golden Harv.	136	116	108	116	105	—	—	—
PERFORM	Dairyland	118	109	105	109	—	—	—	—
PHABULOUS III	Trelay Inc.	136	115	105	114	—	—	—	—
LIGHTNING IV	Jung	—	—	—	—	107	—	—	—
GENOA	NK Brand	120	119	108	114	106	—	—	—
PGI 459	Producer	—	—	—	—	106	—	—	—
AMERISTAND 407TQ	**Am.Alf**	**120**	**113**	**106**	**111**	**111**	—	—	—
6431	Garst	—	—	—	—	109	—	—	—
VELOCITY	**NuTech**	—	—	—	—	**101**	—	—	—
4G418RR	Mycogen	124	108	101	108	—	—	—	—
SPRINGGOLD	Renk	—	—	—	—	—	99	96	98
4A421	Mycogen	120	106	103	107	—	—	—	—
6417	**Garst**	—	—	—	—	**107**	**117**	**108**	**112**
WL 363 HQ	W-L	—	—	—	—	102	—	—	—
WL 343HQ	W-L	120	111	101	108	112	—	—	—
ENHANCER II	BioPlant	—	—	—	—	—	107	105	106
55V48	**Pioneer**	—	—	—	—	**101**	**99**	**99**	**99**
6443 RR	Garst	104	119	104	110	—	—	—	—
6415	Garst	122	119	108	115	105	96	96	96
LEGEND EXTRA	Legend	—	—	—	—	102	—	—	—
6426	Garst	—	—	—	—	—	92	95	94
53Q30	Pioneer	119	107	105	108	—	—	—	—
5312(check)	Pioneer	114	109	105	108	103	100	106	103
VERNAL(check)	Public	99	100	98	99	97	106	109	108
ONEIDA VR(check)	Public	87	91	97	93	100	94	85	89
Checks, tons/acre as hay		*2.2*	*4.5*	*5.7*	*12.4*	*5.4*	*5.1*	*6.1*	*11.2*
LSD 5%		34	15	8	11	13	17	13	17

[1] Varieties are ranked according to their performance across all current trials. Bold varieties have been in Minnesota trials for more than 5 site-years.

Table 3. Alfalfa variety yield as percentage of check varieties at Richmond (Stearns County) and Underwood (Otter Tail County).

		Richmond			Underwood				
		2007 Seeding			2006 Seeding				2008 seeding
Variety[1]	Marketer	2009	2008	2-Year Total	2009	2008	2007	3-Year Total	1-Year Total
PROFUSE BR	Deer Creek	117	113	115	—	—	—	—	—
54V46	Pioneer	—	—	—	115	110	104	109	—
DKA43-13	Dekalb	—	—	—	—	—	—	—	113
MAGNUM VI	Dairyland	—	—	—	115	110	107	110	—
SUMMERGOLD	Renk	112	111	111	—	—	—	—	—
L333HD	Legacy	108	113	111	—	—	—	—	—
PERFORM	Dairyland	—	—	—	122	112	105	112	—
PHABULOUS III	Trelay Inc.	117	106	112	103	99	96	99	—
LIGHTNING IV	Jung	—	—	—	—	—	—	—	113
GENOA	NK Brand	—	—	—	112	104	104	106	—
PGI 459	Producer	—	—	—	—	—	—	—	110
AMERISTAND 407TQ	**Am.Alf**	**112**	**110**	**111**	**113**	**116**	**109**	**113**	—
6431	Garst	—	—	—	—	—	—	—	111
VELOCITY	**NuTech**	—	—	—	—	—	—	—	**108**
SPRINGGOLD	Renk	116	116	116	—	—	—	—	—
6417	**Garst**	**122**	**114**	**118**	—	—	—	—	**99**
WL 363 HQ	W-L	—	—	—	—	—	—	—	110
WL 343HQ	W-L	116	111	113	107	104	100	103	94
55V48	**Pioneer**	**115**	**109**	**112**	—	—	—	—	**110**
6443 RR	Garst	—	—	—	105	101	98	101	—
6400 HT	Garst	105	109	107	104	99	102	101	—
6415	Garst	—	—	—	103	103	98	101	—
53Q30	Pioneer	—	—	—	97	89	95	93	—
420 PLUS	Mustang	—	—	—	—	—	—	—	98
6200 HT	Garst	—	—	—	98	95	99	97	—
5312(check)	Pioneer	104	105	104	102	104	106	104	105
VERNAL(check)	Public	100	100	100	96	99	99	98	92
ONEIDA VR(check)	Public	97	95	96	101	97	96	98	103
Checks, tons/acre as hay		*7.6*	*7.9*	*15.4*	*3.5*	*5.2*	*6.0*	*14.7*	*3.3*
LSD 5%		8	10	7	15	14	11	11	20

[1] Varieties are ranked according to their performance across all current trials. Bold varieties have been in Minnesota trials for more than 5 site-years.

Table 4. Alfalfa variety yield as percentage of check varieties at Grand Rapids (Itasca County).

		Grand Rapids		
		2007 Seeding		
Variety[1]	Marketer	2009	2008	2-Year Total
AMERISTAND 407TQ	**Am.Alf**	**105**	**96**	**100**
6417	**Garst**	**97**	**98**	**97**
55V48	**Pioneer**	**99**	**96**	**98**
5312(check)	Pioneer	107	101	104
VERNAL(check)	Public	96	100	98
ONEIDA VR(check)	Public	97	99	98
Checks, tons/acre as hay		*5.5*	*5.5*	*10.9*
LSD 5%		6	ns	2

[1] Varieties are ranked according to their performance across all current trials. Bold varieties have been in Minnesota trials for more than 5 site-years.

Table 5. Seeding year alfalfa variety yields as a percentage of check varieties at Rosemount (Dakota County), Lamberton (Redwood County) and St. Martin (Stearns County)

Variety [1]	Marketer	Rosemount	Lamberton	St. Martin
FSG 329	Farm Science	—	—	112
DKA43-13	Dekalb	—	103	111
4S417	Mycogen	104	103	107
HYBRIFORCE 807	DairyLand Research	100	105	—
KINGFISHER 243	Byron Seed	—	—	101
REBOUND 5.0	Croplan	101	—	—
FSG 420LH	Farm Science	101	—	—
AMERISTAND 407TQ	**Am.Alf**	**100**	**100**	**101**
HYBRIFORCE-2400	DairyLand	106	95	—
CHESAPEAKE	Dahlco	98	105	97
WL 363 HQ	W-L	100	—	—
AMERISTAND 403T PLUS	Am. Alf.	98	102	98
LEGENDAIRY 5.0	CROPLAN	—	—	98
55V48	**Pioneer**	**99**	**99**	**95**
VELOCITY	**NuTech**	**90**	**100**	**97**
64Q22	Garst	99	101	84
CIMARRON	Great Plains	106	—	—
5312(check)	Pioneer	101	102	101
VERNAL(check)	Public	101	100	101
ONEIDA VR(check)	Public	98	98	98
WL 322HQ	W-L	94	—	—
Checks, tons/acre as hay		*3.8*	*2.5*	*3.8*
LSD 5%		12	14	16

[1] Varieties are ranked according to their performance across all current seeding year trials. Bold varieties have been in Minnesota trials for more than 5 site-years.

Table 6a. Alfalfa variety dry matter yield, milk production (expressed as percent of Vernal), RFQ index, CP and NDF (% dry matter), and NDFD (% NDF); 2009 season totals and weighted averages from a trial seeded in 2008 at Rosemount.

Variety, listed in descending order of milk production	DM Yield [1] Ton/ Acre	Milk, (% of Vernal) [2] Lb/ Acre	Milk, (% of Vernal) [2] Lb/ Ton	RFQ [3], Index	CP [3], % dm	NDF [3], % dm	NDFD [4], % NDF
VELOCITY	5.9	121	107	175	20.8	35.5	42.5
DKA 43-13	5.6	114	105	167	20.5	36.3	42.3
6417	5.5	112	105	169	21.0	35.8	41.5
6431	5.4	110	106	172	21.3	35.8	43.3
6415	5.3	109	105	173	21.0	35.5	42.3
WL 322 HQ	5.1	104	107	175	21.5	35.0	42.8
CIMARRON	5.3	104	101	154	19.8	38.3	40.3
VERNAL	5.2	100	100	147	19.3	39.0	40.0
Vernal, actual values	5.2	14,580	2,817	147	19.3	39.0	40.0
Mean	5.4	109	104	167	20.6	36.4	41.8
LSD (5%)	0.4	8	4	15	1.1	1.7	3.1
CV (%)	5.0	5.3	4.2	6.1	3.5	3.2	5.1

[1] A seasonal 4-harvest total taken 2009.

[2] Milk production (pounds milk per acre and ton) are predicted using the MILK2006 spreadsheet, version milk2006alfalfagrass, developed at the University of Wisconsin.

[3] RFQ = relative forage quality index; CP = % crude protein; and NDF = % neutral detergent fiber. Variables expressed as average concentration for the season.

[4] NDFD = neutral detergent fiber digestibility, expressed as % NDF concentration.

Table 6b. Alfalfa variety dry matter yield, milk production (expressed as percent of Vernal), RFQ index, CP and NDF (% dry matter), and NDFD (% NDF); 2009 season totals and weighted averages from a trial seeded in 2009 at Rosemount.

Variety, listed in descending order of milk production	DM Yield [1]	Milk, (% of Vernal) [2]		RFQ [3],	CP [3],	NDF [3],	NDFD [4],
	Ton/ Acre	Lb/ Acre	Lb/ Ton	Index	% dm	% dm	% NDF
CIMARRON	3.5	104	99	169	19.9	38.4	49.2
VERNAL	3.3	100	100	170	19.6	38.6	50.3
WL 322HQ	3.1	96	102	179	21.2	36.4	48.9
exp. 2302	3.1	95	103	186	21.0	35.9	50.5
VELOCITY	2.9	90	101	181	20.1	37.3	52.2
exp. 2314	2.7	85	104	191	20.9	36.2	54.1
Vernal, actual values	3.3	10,023	3,029	170	19.6	38.6	50.3
Mean	3.1	95	102	179	20.4	37.1	50.8
LSD (5%)	0.3	19	5	21	1.4	2.7/ns	5.8/ns
CV (%)	9.3	12.9	2.9	7.7	4.7	4.8	7.6

[1] A seasonal 2-harvest total taken 2009.

[2] Milk production (pounds milk per acre and ton) are predicted using the MILK2006 spreadsheet, version milk2006alfalfagrass, developed at the University of Wisconsin.

[3] RFQ = relative forage quality index; CP = % crude protein; and NDF = % neutral detergent fiber. Variables expressed as average concentration for the season.

[4] NDFD = neutral detergent fiber digestibility, expressed as % NDF concentration.

Table 7. 2009 forage seed sources.

Marketer	Company	Web URL
Albert Lea	Albert Lea Seed House	www.alseed.com
Allied	Allied Seed	www.alliedseed.com
Am. Alf.	America's Alfalfa	www.americasalfalfa.com
Barenburg	Barenburg Midwest	www.barusa.com
BioPlant	BioPlant Research	P.O. Box 320, Camp Point, IL 62320, 800-593-7708
Byron Seed	Byron Seed	www.bestforage.com/
Croplan	Croplan Genetics	www.croplangenetics.com
Dahlco	Dahlco Seed	www.dahlco.com
Dairyland	Dairyland Seed Co.	www.dairylandseed.com
Deer Creek	Deer Creek Seed	www.deercreekseed.com/index.html
Dekalb	AsgrowDekalb	www.asgrowanddekalb.com/web
Farm Science	Farm Science Genetics	www.farmsciencegenetics.com/
FFR	FFR Cooperative	www.ffrcoop.org
Garst	Garst Seed Co.	www.garstseed.com
Golden Harv.	JC Robinson Seeds/Golden Harvest	www.goldenharvestseeds.com
Jung	Jung Seed Genetics	www.jungseedgenetics.com
La Crosse	LaCrosse Forage and Turf	www.lftseed.com
Legacy	Legacy Seeds, Inc.	www.legacyseeds.com
Legend	Legend Seeds	www.legendseeds.com
LG Seeds	LG Seeds	www.lgseeds.com
Mallard	Mallard Seed	www.mallardseed.com
Mustang	Mustang Seeds	www.mustangseeds.com
Mycogen	Mycogen Seeds	www.mycogen.com
NC+	NC+ Hybrids	www.nc-plus.com
NK Brand	NK Brand	www.nk-us.com
NuTech	NuTech Seed	www.nutechseed.com
Pioneer	Pioneer Hi-Bred International	www.pioneer.com
Prairie	Prairie Brand	www.prairiebrandseed.com/index.html
Producer	Producer's Choice	www.producerschoiceseed.com
Renk	Renk Seed Co.	www.renkseed.com
Trelay Inc.	Trelay Inc.	www.trelay.com
W-L	W-L Research, Inc.	www.wlresearch.com
Ziller	Ziller Seed Co. Inc.	www.zillerseed.com
U of MN	University of Minnesota Forages	http://www.extension.umn.edu/forages/

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Birdsfoot Trefoil

Nancy Ehlke and Donn Vellekson

Birdsfoot trefoil is an excellent non-bloating pasture legume that can also be harvested for hay and silage. It grows under a wide range of soil conditions, and persists longer and performs better than other legumes under poor soil conditions such as low fertility, acidity and poor drainage. It is also persistent when grown with Kentucky bluegrass, reed canarygrass and timothy.

Performance trials of birdsfoot trefoil were established at Rosemount in 1997, 1998, 2001 and 2003, and at Grand Rapids in 1998, 2001 and 2006. The trials are generally harvested twice at Grand Rapids and two or three times at Rosemount.

Winterhardiness is very important and only adapted varieties should be planted. The variety Norcen was released jointly in 1983 by the agriculture experiment stations of Minnesota and six other north central states; it has been a standard ever since. It is winterhardy and has performed well in grazing trials.

Consult forage management specialists for other varieties that may be appropriate for your area.

Birdsfoot Trefoil Planting Rate and Date

Bushel Weight, Pounds.....60

Seeds/Pound..... 372,000

Planting Rate, Pounds/Acre
- Alone..... 8
- In Mixtures..... 6

Planting Rate, Seeds/Sq.Ft.
- Alone..... 70
- In Mixtures..... 50

Planting Date... Early Spring or Summer

Dry matter yield, in tons dry matter per acre, of birdsfoot trefoil varieties seeded at 2 locations.

Variety	Winter Injury,* 5/24/2004	Rosemount 1998	Rosemount 1999-01	Rosemount 2002	Rosemount 2004-06	Grand Rapids 1999-01	Grand Rapids 2002-04	Grand Rapids 2007-09
Bright	—	3.6	3.1	—	—	—	—	—
Dawn	1	4.0	3.8	4.0	4.4	4.8	2.1	3.4
Empire	—	4.0	—	—	—	4.4	—	3.5
Fergus	—	3.9	—	—	—	—	—	—
Georgia 1	—	—	3.6	—	—	4.6	1.8	—
Leo	—	3.9	3.1	—	—	—	—	—
Norcen	1	4.3	3.5	3.9	3.9	4.8	2.1	3.1
Nueltin	1	3.7	3.1	4.0	3.4	4.2	2.2	—
Pardee	8.3	—	—	3.5	0.1	—	1.9	3.5
Roseau	2.5	4.1	3.4	4.1	3.5	4.6	2.1	—
Steadfast	—	3.1	2.7	—	—	3.5	—	—
Trevig	—	4.1	—	4.2	—	—	—	—
Viking	1.8	3.8	3.6	4.0	4.1	4.4	2.1	—
Witt	—	4	3.2	4.1	—	—	2.0	3.4
LSD@5%	0.9	0.5	0.3	0.4	0.3	0.5	0.2	NS

* Winter injury at Rosemount; 1 = no injury; 9 = dead.

Seed sources for alternate forage plots.

Deer Creek Seed	PO Box 105, Ashland, WI 54806	877-247-3736
Pickseed	Box 304, 1 Greenfield Rd., Lindsay, ON Canada K9V 4S3	800-268-2806
Norfarm Seed	31154 430th Ave., Roseau, MN 56751	218-463-2119
Etheridge Farm	1950 Lane 11, Powell, WY 82435	307-754-2371
Allied Seed	9311 Highway 45 Lane, Nampa, ID 83686	888-252-7573
Brett Young LTD	PO Box 99, St. Norbert PS, Winnipeg, MB Canada R3V 1L5	800-665-5015
Wrightson LTD	PO Box 50240, Porirua, New Zealand	64-4-49183335
Agri Pro	PO Box 30, Berthoud, CO 80513	877-943-2827
Cascade Seed	1406 E. Front Ave., Spokane, WA 99220	509-534-9431
Twin City Seed	7265 Washington Ave. S., Edina, 55439	952-944-7105
General Feed and Grain	7128 3rd St., Bonner Ferrys, ID 83805	208-267-3185
Geertson Seed	P.O. Box 205, Greenleaf, ID 83626	800-843-0390
Lethbridge Research Centre	PO Box 3000, Lethbridge, AB Canada T1J4B1	403-327-4561
Northern Excellence	PO. Box 186, Williams, MN 56686	218-783-2214

Please note: No trials of bromegrass, cicer milkvetch, reed canarygrass, tall fescue or timothy were conducted in 2009. The most recent information on these crops is available on the web at www.maes.umn.edu At this site click on Commodity/Crop Links, then on Varietal Trials, which will display a crops listing.

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Varietal Trials Results

January 2010

Kura Clover

Nancy Ehlke and Donn Vellekson

Kura clover is a relatively low growing, spreading perennial legume. It is best used as a grazing crop because of its growth habit and high moisture content. Kura clover can tolerate frequent grazing and has consistently high forage quality, resulting in high animal performance. Kura clover can induce bloat in grazing ruminants and may be best suited for planting in mixtures with cool-season grasses, such as reed canarygrass and orchardgrass.

Kura clover is persistent once established but has poor seedling vigor, slightly less than birdsfoot trefoil. As with other legumes, kura clover requires inoculation with the proper rhizobium to insure atmospheric nitrogen fixation. Because of its excellent persistence and spreading growth habit, kura clover has great potential for soil cover and erosion control in agricultural and nonagricultural areas.

Summary tables include variety trials seeded in 1999, 2002 and 2005 at Rosemount and in 2002 and 2006 at Grand Rapids. Nitrogen was applied at the rate of 30 pounds per acre at the time of seeding to assist early growth. Trials were harvested three times per year at Rosemount and twice per year at Grand Rapids.

Kura Clover Planting Rate and Date

Bushel Weight, Pounds.....60
Seeds/Pound..... 215,000
Planting Rate, Pounds/Acre
Alone.....10
In Mixtures.....6
Planting Rate, Seeds/Sq. Ft.
Alone..... 50
In Mixtures..... 30
Planting Date..... Early Spring or Summer

Dry matter yield, in tons per acre, and vigor of kura clover varieties seeded at 2 locations.

	Vigor**	Rosemount			Grand Rapids	
Variety	5/1/2003	2001-02	2003-05	2006-07	2003-04	2007-09
Cossack	5.0*	4.0	4.0	3.5	1.1	3.9
Endura	3.3	4.3	4.8	3.2	1.2	4.4
NF-93	5.5	4.6	4.7	3.3	0.9	3.8
Rhizo	2.8	4.1	4.0	2.5	0.8	—
LSD@5%	1.0	0.5	0.5	0.8	0.1	0.3

* Yield adjusted due to alfalfa contamination in seedlot.
** Vigor at Rosemount; 1 = least, 9 = best vigor.

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Orchardgrass

Nancy Ehlke and Donn Vellekson

Orchardgrass often is used in hay and pasture mixes with other grasses and legumes because it establishes rapidly and recovers quickly after grazing or harvesting. Its major limitation is a lack of winterhardiness, but in areas with reliable snow cover it can persist and remain productive for many years.

Maturity is another important consideration. Other grass and legume species in the mixture, seed availability and timing of needed grazing or cutting will help determine the best variety for a certain situation.

Orchardgrass varieties were established in pure stands in 2002 and 2005 at Rosemount, and in 1998, 2002 and 2006 at Grand Rapids.

Experimental plots were generally harvested three times per year at Rosemount and two or three times per year at Grand Rapids. Nitrogen was applied in the early spring and after each harvest at a rate of 50 pounds per acre for each application.

Orchardgrass Planting Rate and Date

Bushel Weight, Pounds..... 14
Seeds/Pound..... 653,000
Planting Rate, Pounds/Acre
Alone.....10
In Mixtures.....3
Planting Rate, Seeds/Sq. Ft.
Alone..... 150
In Mixtures.....45
Planting Date
Alone... Early Spring or Late Summer
In Mixtures.....Use Date for Legume

Dry matter yield of orchardgrass, in tons dry matter per acre, of orchardgrass varieties seeded at two locations.

Variety	% Heading* 5/30/2006	Winter Injury** 5/16/2007	Rosemount 2003-05	Rosemount 2006-07	Rosemount 2007-08	Grand Rapids 1999-01	Grand Rapids 2004-05	Grand Rapids 2007-09
AC Nordic	—	—	—	—	—	3.7	—	—
Albert	3	4.8	—	3.7	3.1	3.9	—	3.2
Ambassador	—	—	—	—	—	3.6	—	—
Bengal	—	—	—	—	—	—	—	—
Condor	—	—	—	—	—	3.8	—	—
Duke	8	5.8	3.7	3.5	3.0	3.8	1.6	3.3
Elsie	—	—	—	—	—	3.5	—	—
Extend	—	—	3.6	—	—	—	1.6	—
Haymate	—	—	—	—	—	3.7	—	—
Hawkeye	—	—	3.8	—	—	3.9	1.6	—
Justus	16	7.5	3.4	3.5	3.1	3.4	1.5	2.7
Kayak	50	1.8	—	3.6	3.3	—	—	3.5
Megabite	—	—	3.8	—	—	3.7	1.7	—
Mammoth	—	—	—	—	—	—	—	—
Napier	3	5.8	—	3.6	3.3	—	—	3.0
Orion	—	—	3.5	—	—	4.1	1.4	—
Potomac	3	7.0	3.8	3.6	2.6	—	1.3	3.2
Warrior	6	7.8	3.4	4.0	2.9	—	1.5	2.8
LSD 5%	12	1.2	NS	NS	0.6	0.4	NS	0.6

*Percent heading at first harvest, higher percentage = earlier maturity.
** Winter injury; 1 = no injury, 9 = dead.

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Red Clover

Nancy Ehlke and Donn Vellekson

Red clover can be seeded in pure stands or with grasses for grazing, hay or silage. It is more easily established in pasture renovation than either alfalfa or trefoil.

Historically, varieties of red clover have not persisted beyond two crop years in Minnesota because they are susceptible to diseases and winterkill. However, most of the improved varieties currently sold for use in Minnesota can persist for three years if there is good winter snow cover.

Experimental varietal trial plots were established at Grand Rapids in 1999, 2002 and 2006, and at Rosemount in 1999, 2002, 2005 and 2006. Harvest frequency generally is three times per year.

Winter injury at Rosemount was quite severe in 2003-04 and 2007-08. Varietal differences were observed in 2004. Ratings in the summary table may give some indication as to winterhardiness in the second or third production year.

A benefit of red clover is its resistance to potato leafhopper injury. Nonetheless, a severe infestation at Rosemount in 2003 injured some varieties. Scarlett and Marathon had very little injury while Freedom and Arlington had severe chlorosis from the feeding insects.

Red Clover Planting Rate and Date

Bushel Weight, Pounds	60
Seeds/Pound	272,000
Planting Rate, Pounds/Acre	
Alone	9
In Mixtures	5
Planting Rate, Seeds/Sq. Ft.	
Alone	55
In Mixtures	30
Planting Date	
Alone	Early Spring to September 1

Tons per acre dry matter, leafhopper injury and winter injury on red clover varieties seeded at 2 locations.

Variety	Potato* Leafhopper Injury 7/14/2003	Winter Injury** 5/24/2004	Rosemount 2000	Rosemount 2003	Rosemount 2006-07	Rosemount 2007	Grand Rapids 2000-01	Grand Rapids 2003-04	Grand Rapids 2007-09
Arlington	3.5	6.5	5.2	3.6	4.3	3.7	3.0	1.2	3.1
Cinnamon Plus	2.3	7.5	—	4.2	4.8	4.3	—	1.3	3.5
Freedom	4.8	8.5	5.5	3.7	—	—	3.2	1.2	—
Juliette	3	6.3	5.6	4.0	—	—	3.3	1.3	—
Marathon	1.5	5	5.6	4.3	4.4	4.2	3.2	1.4	3.4
Prima	—	—	5.3	—	—	—	3.5	—	—
Redlan Graze II	1.3	8	—	4.3	—	4.4	—	1.5	—
Redstar	—	—	5.9	—	—	—	3.4	—	—
Scarlett	1.3	5.3	—	4.0	4.7	4.3	—	1.4	3.7
LSD 5%	0.9	1.4	0.6	0.3	0.6	0.4	0.3	0.2	0.4

* Potato leafhopper injury at Rosemount; 1 = none, 5 = worst.
** Winter Injury; 1 = none, 9 = all dead.

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Varietal Trials Results

January 2010

Barley

Kevin Smith and Ed Schiefelbein

Barley varieties are compared in replicated trials at Crookston, Morris, St. Paul, Stephen and Roseau. Data collected from these trials should be used to make comparisons only among those varieties included in the trials. Descriptions of barley varieties are listed by year of release.

Variety Selection Criteria

Most barley producers in the region grow barley for malt and select varieties approved by the American Malting Barley Association (AMBA). The most important industry specifications for making malting grade are grain protein, kernel plumpness and deoxynivalenol (DON), the toxin produced by the Fusarium Head Blight (FHB) pathogen. Please consult the AMBA recommended varieties for the most current information about industry acceptance of malting barley varieties at www.ambainc.org.

For most producers the disease FHB and the presence of DON in harvested grain are the two most important factors limiting production of malting barley in the region. The two-rowed variety Conlon typically has slightly lower DON compared to the other varieties. Among the current six-rowed malting varieties there are no significant differences for resistance to FHB.

General-Purpose Varieties

Rasmusson — High yield, medium maturity. Good lodging resistance, slightly shorter plant height. Six-rowed, semi-smooth awns, short rachilla hairs, colorless aleurone. Classified as a malting variety by AMBA. Resistant to spot blotch. Developed from crosses involving Lacey. Released by Minn. AES in 2008. **PVP (94).**

Stellar-ND — Medium yield, medium maturity. Good lodging resistance and kernel plumpness. Six-rowed, semi-smooth awns, long rachilla hairs, colorless aleurone. Classified as a malting variety by AMBA. Resistant to spot blotch; slightly better net blotch resistance compared to Robust. Released by N.D. AES in 2005. **PVP (94).**

Tradition — High yield, medium maturity. Medium lodging resistance and kernel plumpness. Six-rowed, semi-smooth awns, long rachilla hairs, colorless aleurone.

Relative grain yield (percent of the mean of the trial) of barley varieties showing single-year (2009) and multiple-year comparisons (2007-2009).

	Crookston		Morris		Stephen		St. Paul	Roseau	State Mean	
Variety	2009	3-year	2009	2-year[2]	2009	3-year	2-year[1]	2-year[1]	2009	3-year
Robust	90	94	95	94	77	84	96	99	87	93
Lacey	98	103	110	111	97	106	105	106	102	106
Rasmusson[3]	106	104	113	112	100	105	103	113	106	106
Stellar ND	101	100	92	91	109	106	98	102	101	100
Tradition	92	96	111	104	102	101	101	100	102	100
Conlon[4]	113	95	—	96	100	89	81	91	106	90
LSD 0.05	20	8	31	12	17	8	8	8	12	5
Mean, Bu/A	106	111	71	75	111	111	111	113	98	105

[1] Only two years of data, 2007 and 2008.
[2] Only two years of data, 2007 and 2009.
[3] Only one year of data available at Roseau.
[4] Only one year of data available at Morris.

Classified as a malting variety by AMBA. Resistant to spot blotch; slightly better net blotch resistance compared to Robust. Developed by Busch-Agricultural Resources Inc. (BARI). Released 2003. **PVP (94).**

Lacey — High yield, medium maturity. Good lodging resistance and kernel plumpness. Six-rowed, semi-smooth awns, short rachilla hairs, colorless aleurone. Classified as a malting variety by AMBA. Resistant to spot blotch. Developed from crosses involving Robust, Excel and Stander. Released by Minn. AES in 2000. **PVP (94).**

Conlon — Medium yield, early maturity. Moderate lodging resistance and very plump kernels. Two-rowed, semi-smooth awns, long rachilla hairs, colorless aleurone. Classified as a malting variety by AMBA. Resistant to net blotch but moderately susceptible to spot blotch compared to Robust. Released by N.D. AES in 1996. **PVP (94).**

Robust — Low yield, medium maturity. Medium lodging resistance and good kernel plumpness. Six-rowed, semi-smooth awn, short rachilla hairs, colorless aleurone. Classified as a malting variety by AMBA. Resistant to spot blotch. Developed from crosses involving Morex and Manker. Released by Minn. AES 1983.

Special-Purpose Varieties

Royal — Intended for use as a forage-companion crop and feed-grain variety. Not a malting variety. Six-rowed, semi-smooth awn, blue aleurone, semidwarf stature. Superior in forage quality (RFV) compared to taller varieties based on digestibility and intake potential; low in fiber and lignin. Similar to Robust in forage protein and forage yield at the soft dough stage. Because of its short stature and superior lodging resistance Royal competes less with underseeded forage legumes than the taller barley and oat varieties. Resistant to spot blotch. Developed from crosses involving Robust, Azure and semi-dwarf Minn. M32. Released by Minn. AES 1994. **PVP (94).**

Test Plot Research

Test plot establishment and management were supervised by John Wiersma and George Nelson.

Agronomic characteristics of barley varieties, 2004–2009.

Variety	Type	Use	Heading (DAP)	Height (inches)	Lodging (%)	Plump (%)	Protein (%)
Robust	6-row	Malt	58	34.0	med.	86	13.8
Lacey	6-row	Malt	58	31.9	strong	87	14.0
Rasmusson	6-row	Malt	58	30.2	strong	82	13.2
Stellar ND	6-row	Malt	58	31.8	strong	86	13.0
Tradition	6-row	Malt	59	32.2	med.	85	13.3
Conlon	2-row	Malt	55	30.9	med.	93	13.5
No. of Trials			18	16	15	14	14

Disease reactions of barley varieties in multiple-year comparisons[1].

Variety	Fusarium Head Blight	Net Blotch	Septoria Speckled Leaf Blotch	Spot Blotch	Stem Rust[2]
Robust	8	8	9	2	1
Lacey	8	8	9	2	1
Rasmusson	8	9	9	2	1
Stellar ND	8	7	9	2	1
Tradition	8	7	9	2	1
Conlon	7	5	9	3	1

[1] 1-9 scale where 1 = most resistant, 9 = most susceptible.
[2] Reaction to the dominant strain of the stem rust pathogen.

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Corn Grain

Tom Hoverstad, Jeff Coulter, George Nelson, Steve Quiring and Mark Hanson

The Minnesota Corn Hybrid Evaluation Program is conducted by the University of Minnesota Agricultural Experiment Station to provide unbiased information for use by corn growers when they choose hybrids to buy and grow. The program was financed in part by entry fees from private seed companies that chose to enter their hybrids for testing.

Test Locations

Test zones, locations and maturities are:

Southern Zone:

Lamberton, Waseca and Rochester

Early Maturity Trial - 103 Relative Maturity (RM) and earlier hybrids

Late Maturity Trial - 104 RM and later hybrids

Central Zone:

Morris and Rosemount

Early Maturity Trial - 96 RM and earlier hybrids

Late Maturity Trial - 97 RM and later hybrids

Northern Zone:

Staples, Rothsay and Crookston

Testing Procedure

Entries: Seed corn companies choose their entries for each zone. Entries in each trial were based on the relative maturity (RM) provided by the company. The University of Minnesota Corn Testing Committee could also choose and enter hybrids in each test. All locations tested three replications for each entry.

Presentation of Data

Yields are given for individual locations along with yields and harvest moisture contents averaged across locations for 2009. Reported yields are adjusted to 15.5% grain moisture. Hybrids are ranked within a maturity group by moisture content averaged across locations for 2009.

Identification of Traits

Genetic modifications of hybrids are identified using generic terms to describe the trait without identifying the specific event for genetic modification.

For example, Bt will indentify genetic modification for corn borer resistance but will not differentiate between the Bt 11 event, the YieldGuard corn borer event or the Herculex corn borer events.

Identifiers will be:

Bt = European corn borer resistance
CRW = Corn rootworm resistance
GLY = Glyphosate herbicide resistance
LL = Liberty herbicide resistance

Least Significant Difference

The LSD (Least Significant Difference) figures at the bottom of the yield columns in the tables are statistical measures of variability in the trials. These values may be used to determine whether the difference between any two hybrids is likely to be a real difference or just natural variation.

If the yield difference between two hybrids is equal to or greater than the LSD, then one can be confident

Companies participating in the 2009 hybrid corn grain trials.

AgriGold Hybrids	www.agrigold.com
Albert Lea Seed House (Viking Hybrids)	www.alseed.com
Anderson Seeds	37825 County Rd 63, St Peter, MN 56082
Blue River Hybrids	www.blueriverorgseed.com
Channel	www.channelbio.com
Dahlco Seeds	www.dahlcoseeds.com
Dahlman Seed Co.	www.dahlmanseed.com
Dairyland Seed Co., Inc.	www.dairylandseed.com
Dekalb	www.dekalb.com, www.asgrow.com
Dyna-Gro / CPS	www.dynagroseed.com/dynagro/
G2 Genetics	www.yieldleader.com
Gold Country Seed Inc.	www.goldcountryseed.com
Hyland Seeds	www.hylandseeds.com
Kaltenberg Seeds	www.kaltenbergseeds.com
Kruger Seed Co.	www.krugerseed.com
Legacy Seeds Inc.	www.legacyseeds.com
NuTech Seed	www.nutechseed.com
OCIA MN Education Committee (Viking Hybrids)	www.mnocia.org
Peterson Farms Seed	www.petersonfarmsseed.com
Pioneer Hi-Bred International	www.pioneer.com/usa/
Proseed Inc.	www.proseed.net
Renk Seed Co.	www.renkseed.com
Seeds 2000	www.seeds2000.net
Titan Pro	www.titanprosci.com
Wensman Seed Co.	www.wensmanseed.com

that the two hybrids probably differ in yield potential. We show LSD values with a 0.2 alpha level, which means that when two hybrids differ in yield by the LSD value or more, one can be 80% confident that the two hybrids differ in yield potential. The higher yielding one is the better hybrid from the yield standpoint. If the yield difference between two hybrids is less than the LSD, the two hybrids probably do not differ significantly in yield potential.

Corn Planting Rate and Date

Bushel Weight, Pounds.....56
Planting Rate, Seeds/Acre.....33,000
Planting Date..... April 15 – May 5

Individual trial information, 2009

Location	Cooperators	Previous Crop	Planting Date	Harvest Dates
Lamberton	Steve Quiring	Soybean	4 May	12 November
Waseca	Tom Hoverstad	Soybean	4 May	8 November
Rochester	Fritz Breitenbach	Soybean	8 May	13 November
Morris	George Nelson	Soybean	11 May	Early Hybrids, 4 November Late Hybrids, 11 November
Rosemount	Jerry Holz	Soybean	6 May	16 November
Staples	Bob Schafer	Corn	14 May	17 November
Rothsay	George Nelson Troy Larson	Soybean	19 May	24 November
Crookston	Mark Hanson	Wheat	11 May	19 November

Early maturity hybrids, southern locations, 2009.

Source / Brand	Hybrid	Traits	Relative Maturity	Yield, Bushels/Acre at: Lamberton	Rochester	Waseca	Average Across Locations Bu/Acre	% Moisture
97 and earlier RM hybrids								
Renk	RK570VT3	Bt CRW GLY	95	217	205	226	216	20.0
Dahlman	R48-07 VT3	Bt CRW GLY	95	175	205	232	204	20.5
Kruger	K-6097VT3	Bt CRW GLY	97	205	218	247	223	20.9
Kruger	K-6295VT3	Bt CRW GLY	95	208	197	219	208	21.2
Viking	Y74-96RL	Bt CRW GLY LL	96	162	178	204	182	21.3
Kruger	K-6093VT3	Bt CRW GLY	93	215	212	231	219	21.4
Wensman Seed	W 7270VT3	Bt CRW GLY	97	203	193	228	208	21.6
NuTech Seed	3T-295 VT3	Bt CRW GLY	95	185	188	212	195	22.1
Dahlman	R48-55 VT3	Bt CRW GLY	96	196	193	202	197	22.3
G2 Genetics	5H-797 RR/HX	Bt Gly LL	96	202	193	225	207	22.4
G2 Genetics	5H-199 RR/HX	Bt Gly LL	97	176	198	222	199	22.4
Anderson Seeds	628 VT3	Bt CRW GLY	96	173	191	231	198	22.5
NuTech Seed	3T-098 VT3	Bt CRW GLY	96	196	207	225	209	22.7
G2 Genetics	5X-999 RR/HXT	Bt CRW GLY LL	97	165	208	220	197	22.7
G2 Genetics	5H-700B RR/HX	Bt Gly LL	97	195	192	217	201	22.8
NuTech Seed	5N-398 GT/CB/LL/RW	Bt CRW GLY LL	97	214	193	233	213	22.9
97 and earlier RM Averages:				**193**	**198**	**223**	**205**	**21.9**
98 to 101 RM Hybrids								
Renk	RK575VT3	Bt CRW GLY	98	170	206	227	201	21.1
Dekalb	DKC48-37 (VT3)	Bt CRW GLY	98	174	182	227	194	21.1
Anderson Seeds	6043	—	98	207	180	211	199	21.5
Dekalb	DKC50-66 (VT3)	Bt CRW GLY	100	174	209	235	206	21.8
Kruger	K-6200VT3	Bt CRW GLY	100	192	193	243	209	21.9
AgriGold	A6220VT3	Bt CRW GLY	98	169	188	226	194	21.9
Dahlman	R49-28 VT3	Bt CRW GLY	98	187	187	203	192	22.1
Kruger	K-6298VT3	Bt CRW GLY	98	183	192	229	201	22.1
Dyna-Gro Seed	55V18	Bt CRW GLY	101	206	187	220	205	22.4
Viking	7809VT3	Bt CRW GLY	98	200	186	210	199	22.7
NuTech Seed	3T-601 VT3	Bt CRW GLY	101	198	198	209	202	22.7
Kruger	K-6499VT3	Bt CRW GLY	99	197	199	243	213	22.8
Anderson Seeds	622 VT3	Bt CRW GLY	98	207	171	193	191	23.0
Dairyland	ST-9500Q	Bt CRW GLY LL	99	209	197	229	212	23.1
Dekalb	DKC50-44 (VT3)	Bt CRW GLY	100	194	196	225	205	23.1
Titan Pro	87A99GL	Bt CRW GLY LL	99	201	189	230	207	23.3

Early maturity hybrids, southern locations, 2009 (continued).

Source / Brand	Hybrid	Traits	Relative Maturity	Yield, Bushels/Acre at: Lamberton	Rochester	Waseca	Average Across Locations Bu/Acre	% Moisture
98 to 101 RM Hybrids (continued)								
AgriGold	A6225VT3	Bt CRW GLY	98	188	191	234	204	23.3
Renk	RK594GTCBLLRW	Bt CRW GLY LL	100	192	184	222	199	23.3
Anderson Seeds	6073	—	101	204	199	248	217	23.4
Viking	W86-00L	Bt LL	100	182	196	212	197	23.4
G2 Genetics	5H-501 RR/HX	Bt Gly LL	101	179	217	232	209	23.5
Channel	199-55VT3	Bt CRW GLY	99	193	206	223	207	23.7
Channel	200-22VT3	Bt CRW GLY	100	183	204	241	209	23.7
G2 Genetics	5H-702 RR/HX	Bt Gly LL	101	169	190	238	199	23.9
Viking	60-01N	—	101	230	173	246	216	24.1
Pioneer Brand	37N68	Bt CRW GLY	101	195	181	221	199	24.1
G2 Genetics	5X-802 RR/HXT	Bt CRW GLY LL	101	187	162	211	187	24.2
Kaltenberg	K4149LLGT3	GLY LL	98	198	161	217	192	24.2
Viking	LB6758	Bt LL	98	191	191	232	205	24.2
Kruger	K-6401VT3	Bt CRW GLY	101	196	177	235	202	24.3
NuTech Seed	1N-001 CB/LL/RW	Bt CRW LL	101	178	188	199	188	24.6
NuTech Seed	3T-401 VT3	Bt CRW GLY	101	185	203	242	210	24.7
NuTech Seed	3T-302 VT3	Bt CRW GLY	101	165	170	228	188	25.4
NuTech Seed	1B-202 CB/LL	Bt LL	101	180	185	230	199	25.7
AgriGold	A6279VT3	Bt CRW GLY	101	173	183	231	196	25.8
NuTech Seed	3T-301 VT3	Bt CRW GLY	101	204	184	235	208	26.0
Viking	J66-00L	Bt LL	100	180	174	220	191	26.2
NuTech Seed	3T-801 VT3	Bt CRW GLY	101	218	169	235	207	26.2
98 to 101 RM Averages:				**191**	**188**	**226**	**202**	**23.5**
102 to 103 RM Hybrids								
Dekalb	DKC52-59 (VT3)	Bt CRW GLY	102	200	210	243	217	22.3
Kruger	K-6102VT3	Bt CRW GLY	102	203	204	238	215	22.9
NuTech Seed	5B-804 GT/CB/LL	Bt Gly LL	103	185	203	217	201	23.0
NuTech Seed	3A-804 GT	GLY	103	214	200	226	213	23.7
Pioneer Brand	36V53	Bt GLY	102	213	202	232	216	23.8
Dairyland	ST-9703Q	Bt CRW GLY LL	103	195	176	223	198	23.9
Dekalb	DKC53-41 (VT3)	Bt CRW GLY	103	224	210	249	228	23.9
NuTech Seed	3T-904 VT3	Bt CRW GLY	103	202	178	224	202	24.4
AgriGold	A6320VT3	Bt CRW GLY	103	169	180	223	191	24.5
Renk	RK698VT3	Bt CRW GLY	103	187	184	242	204	24.6
Titan Pro	89A02GL	Bt CRW GLY LL	102	185	186	208	193	24.8
Anderson Seeds	103 VT3	Bt CRW GLY	103	196	201	233	210	25.0
AgriGold	A6309VT3	Bt CRW GLY	103	202	206	246	218	25.1
Titan Pro	87A03	Bt CRW GLY LL	103	197	203	240	213	25.2
Anderson Seeds	103 R	GLY	102	171	175	239	195	25.7
Renk	RK670VT3	Bt CRW GLY	103	205	178	228	204	26.0
NuTech Seed	3T-603 VT3	Bt CRW GLY	103	198	165	212	192	26.3
Wensman Seed	W 7360VT3	Bt CRW GLY	103	178	195	242	205	26.3
102 to 103 RM averages:				**196**	**192**	**231**	**206**	**24.5**
Southern locations, early maturity averages:				**192**	**191**	**227**	**204**	**23.4**
LSD(0.20)				**24**	**15**	**16**	**11**	**0.6**

Late maturity hybrids, southern locations, 2009.

Source / Brand	Hybrid	Traits	Relative Maturity	Yield, Bushels/Acre at: Lamberton	Rochester	Waseca	Average Across Locations Bu/Acre	% Moisture
104 RM and later hybrids								
Legacy	L-5350 GTCBLL	Bt Gly LL	104	197	200	214	204	24.3
AgriGold	A6325VT3	Bt CRW GLY	104	219	200	224	214	24.5
Kaltenberg	K5332GT	GLY	104	221	185	241	216	24.7
Titan Pro	89A05GL	Bt CRW GLY LL	105	177	161	221	186	24.9
Anderson Seeds	105 VT3	Bt CRW GLY	105	178	165	215	186	25.3
Viking	GT5781	GLY	104	190	176	218	195	25.7
Kruger	K-6208VT3	Bt CRW GLY	108	183	213	224	206	25.7
G2 Genetics	5H-905 RR/HX	Bt Gly LL	105	211	173	242	209	25.7

Late maturity hybrids, southern locations, 2009 (continued).

Source / Brand	Hybrid	Traits	Relative Maturity	Yield, Bushels/Acre at: Lamberton	Rochester	Waseca	Average Across Locations Bu/Acre	% Moisture
104 RM and later hybrids (continued)								
NuTech Seed	3T-603A VT3	Bt CRW GLY	104	166	183	219	189	25.8
Pioneer Brand	35F44	Bt CRW GLY	105	212	165	225	201	25.9
Legacy	L-4938 VT3	Bt CRW GLY	105	162	179	216	186	26.2
Kaltenberg	K5355GTBt11	Bt GLY	104	213	162	206	194	26.4
Kaltenberg	K5588LLRRHXT	Bt CRW GLY LL	105	170	182	207	186	26.9
Blue River Hybrids	53R57	—	105	232	181	228	214	26.9
G2 Genetics	5X-905 RR/HXT	Bt CRW GLY LL	105	214	170	223	202	27.0
G2 Genetics	5H-007A RR/HX	Bt Gly LL	107	158	183	208	183	27.4
Wensman Seed	W 7433VT3	Bt CRW GLY	105	208	180	221	203	27.4
G2 Genetics	5X-909 RR/HXT	Bt CRW GLY LL	109	223	191	213	209	27.5
Dairyland	ST-9006	Bt CRW GLY	106	188	181	225	198	27.6
Kruger	K-6606VT3	Bt CRW GLY	106	218	172	213	201	27.6
Dekalb	DKC55-07 (VT3)	Bt CRW GLY	105	195	162	226	194	27.7
G2 Genetics	5H-007 RR/HX	Bt Gly LL	107	122	173	220	172	27.7
Dairyland	ST-9206Q	Bt CRW GLY LL	106	198	155	211	188	27.8
NuTech Seed	3T-106 VT3	Bt CRW GLY	106	204	169	220	197	28.1
Kruger	K-6205VT3	Bt CRW GLY	105	201	181	220	201	28.1
Renk	RK760VT3	Bt CRW GLY	106	238	155	227	207	28.2
G2 Genetics	5H-906 RR/HX	Bt Gly LL	106	190	150	206	182	28.3
G2 Genetics	5X-005 RR/HXT	Bt CRW GLY LL	105	169	150	190	170	28.3
Renk	RK711RRHXTRA	Bt CRW GLY LL	107	154	168	204	175	28.3
NuTech Seed	3T-706 VT3	Bt CRW GLY	106	205	178	232	205	28.3
NuTech Seed	5X-805 RR/HXT	Bt CRW GLY	105	168	172	207	182	28.3
Renk	RK744VT3	Bt CRW GLY	107	171	163	236	190	28.4
G2 Genetics	1H-005 HX/LL	Bt LL	105	218	159	193	190	28.4
Dyna-Gro Seed	56R29	Bt CRW GLY	106	182	172	208	187	28.4
Kruger	K-6006VT3	Bt CRW GLY	106	188	177	224	196	28.4
Dekalb	DKC57-66 (VT3)	Bt CRW GLY	107	196	182	218	199	28.5
Kruger	K-6408VT3	Bt CRW GLY	108	165	176	207	183	28.6
Titan Pro	89X04	Bt CRW LL	104	198	158	222	193	28.8
Blue River Hybrids	57H36	—	107	192	165	205	187	29.1
Dekalb	DKC61-69 (VT3)	Bt CRW GLY	111	256	188	209	218	29.6
Dairyland	ST-8208	Bt CRW LL	108	189	180	208	192	29.7
Dekalb	DKC57-50 (VT3)	Bt CRW GLY	107	183	160	211	185	30.1
G2 Genetics	5X-707 RR/HXT	Bt CRW GLY LL	107	168	161	216	181	30.2
Channel	207-07VT3	Bt CRW GLY	107	198	180	239	206	30.8
Wensman Seed	W 7455VT3	Bt CRW GLY	107	204	164	214	194	30.9
Wensman Seed	W 7469VT3	Bt CRW GLY	109	192	152	191	178	31.0
Dekalb	DKC59-64 (VT3)	Bt CRW GLY	109	207	171	210	196	31.5
Southern locations, late maturity averages:				**193**	**173**	**217**	**194**	**27.8**
LSD(0.20)				**24**	**21**	**15**	**12**	**1.5**

Early maturity hybrids, central locations, 2009.

Source / Brand	Hybrid	Traits	Relative Maturity	Yield, Bushels/Acre at: Morris	Rosemount	Average Across Locations Bu/Acre	% Moisture
93 and earlier RM hybrids							
PFS	92L90	Bt GLY LL	90	144	180	162	22.4
Kruger	K-2090RR/YGCB	Bt GLY	90	135	196	165	23.3
Dahlman	R45-25 VT3	Bt CRW GLY	90	174	195	184	24.0
G2 Genetics	5X-591 RR/HXT	Bt CRW GLY LL	91	130	198	164	24.7
Kruger	K-6490VT3	Bt CRW GLY	90	157	214	185	25.4
NuTech Seed	3P-494+ RR/YGPL	Bt GLY	93	192	211	201	25.8
NuTech Seed	3T-393A VT3	Bt CRW GLY	92	179	178	179	25.8
NuTech Seed	3T-493 VT3	Bt CRW GLY	92	173	192	182	25.9
Dekalb	DKC42-72 (VT3)	Bt CRW GLY	92	166	213	190	25.9
Dekalb	DKC43-27 (VT3)	Bt CRW GLY	93	146	185	165	26.0
NuTech Seed	3T-894 VT3	Bt CRW GLY	93	136	211	174	26.2
Dekalb	DKC38-89 (VT3)	Bt CRW GLY	89	133	205	169	27.4

Early maturity hybrids, central locations, 2009 (continued).

Source / Brand	Hybrid	Traits	Relative Maturity	Yield, Bushels/Acre at: Morris	Yield, Bushels/Acre at: Rosemount	Average Across Locations Bu/Acre	Average Across Locations % Moisture
93 and earlier RM hybrids (continued)							
Channel	193-45R	GLY	93	145	186	165	27.5
Wensman Seed	W 7143VT3	Bt CRW GLY	93	129	207	168	27.6
G2 Genetics	5X-594 RR/HXT	Bt CRW GLY LL	93	140	188	164	27.7
Pioneer Brand	38H08	Bt GLY	92	157	216	186	28.2
NuTech Seed	5B-593 GT/CB/LL	Bt GLY LL	92	174	215	195	28.2
NuTech Seed	3C-889A RR/YGCB	Bt GLY	89	156	225	191	28.3
PFS	68L91	Bt CRW GLY	91	133	206	169	28.4
Dairyland	ST-6992	Bt GLY	92	141	221	181	28.7
Renk	RK434RRYGCB	Bt GLY	92	137	207	172	28.7
NuTech Seed	3T-295A VT3	Bt CRW GLY	93	149	196	172	28.7
Dekalb	DKC40-20 (VT3)	Bt CRW GLY	90	116	187	151	28.9
NuTech Seed	3T-390 VT3	Bt CRW GLY	90	132	220	176	29.0
NuTech Seed	3T-294 VT3	Bt CRW GLY	92	157	207	182	29.5
Kruger	K-6093VT3	Bt CRW GLY	93	138	213	176	29.8
93 RM and earlier averages:				**149**	**203**	**176**	**27.0**
94 to 96 RM hybrids							
Dairyland	ST-9395	Bt GLY	95	185	223	204	24.8
Dairyland	ST-9196	Bt CRW GLY	96	149	209	179	25.5
Seeds 2000	9501VT3	Bt CRW GLY	95	168	224	196	25.5
Dahlman	R48-07 VT3	Bt CRW GLY	95	144	207	175	26.2
Anderson Seeds	707 VT3	Bt CRW GLY	94	143	200	172	26.9
Renk	RK570VT3	Bt CRW GLY	95	138	232	185	27.1
NuTech Seed	3C-395 RR/YGCB	Bt GLY	95	172	195	183	27.7
Wensman Seed	W 8180VT3	Bt CRW GLY	95	124	200	162	27.7
Seeds 2000	9502VT3	Bt CRW GLY	95	138	207	172	27.8
Kaltenberg	K3843VT3	Bt CRW GLY	95	143	194	168	27.8
NuTech Seed	3T-295 VT3	Bt CRW GLY	95	148	196	172	28.0
Dekalb	DKC46-60 (VT3)	Bt CRW GLY	96	138	208	173	28.2
Channel	195-46VT3	Bt CRW GLY	95	129	188	159	28.8
NuTech Seed	3T-294A VT3	Bt CRW GLY	94	127	206	166	29.1
G2 Genetics	5H-797 RR/HX	Bt GLY LL	96	149	225	187	29.2
Dahlman	R48-55 VT3	Bt CRW GLY	96	117	200	158	29.2
NuTech Seed	1N-695 CB/LL/RW	Bt CRW LL	95	131	183	157	29.3
Renk	RK563CBLLRW	Bt CRW LL	96	156	213	184	29.4
Proseed	896VT3	Bt CRW GLY	96	139	211	175	29.5
Legacy	L-3538 VT3	Bt CRW GLY	95	179	213	196	29.6
Anderson Seeds	628 VT3	Bt CRW GLY	96	164	204	184	29.6
NuTech Seed	5N-398B GT/CB/LL/RW	Bt CRW GLY LL	96	164	215	189	29.6
NuTech Seed	3T-098 VT3	Bt CRW GLY	96	151	224	187	29.8
Renk	RK501VT3	Bt CRW GLY	95	141	216	179	30.3
Kruger	K-6295VT3	Bt CRW GLY	95	148	231	189	30.4
Pioneer Brand	38P43	Bt CRW GLY	95	151	191	171	30.5
NuTech Seed	3A-198 GT	GLY	96	123	187	155	30.9
NuTech Seed	3T-098A VT3	Bt CRW GLY	96	151	213	182	31.5
94 to 96 RM averages:				**147**	**208**	**177**	**28.6**
Central locations, early maturity averages:				**148**	**205**	**176**	**27.8**
LSD(0.20)				**25**	**16**	**15**	**1.6**

Late maturity hybrids, central locations, 2009.

Source / Brand	Hybrid	Traits	Relative Maturity	Yield, Bushels/Acre at: Morris	Yield, Bushels/Acre at: Rosemount	Average Across Locations Bu/Acre	Average Across Locations % Moisture
97 to 99 RM hybrids							
Renk	RK575VT3	Bt CRW GLY	98	186	211	199	23.4
Kruger	K-6097VT3	Bt CRW GLY	97	134	228	181	25.0
PFS	53B97	Bt CRW GLY	97	167	219	193	25.7
Dekalb	DKC48-37 (VT3)	Bt CRW GLY	98	165	211	188	25.7

Late maturity hybrids, central locations, 2009 (continued).

Source / Brand	Hybrid	Traits	Relative Maturity	Yield, Bushels/Acre at: Morris	Rosemount	Average Across Locations Bu/Acre	% Moisture
97 to 99 RM hybrids (continued)							
G2 Genetics	5H-199 RR/HX	Bt GLY LL	97	190	232	211	26.0
NuTech Seed	3T-098B VT3	Bt CRW GLY	98	158	232	195	26.1
Wensman Seed	W7289VT3	Bt CRW GLY	99	164	218	191	26.2
Seeds 2000	9901VT3	Bt CRW GLY	99	164	207	186	26.3
Blue River Hybrids	41R00	—	99	164	202	183	26.3
G2 Genetics	5X-999A RR/HXT	Bt CRW GLY LL	99	188	197	192	26.8
Hyland	HL CVR68	Bt CRW GLY	98	154	203	179	27.1
Dahlman	R49-28 VT3	Bt CRW GLY	98	154	220	187	27.2
NuTech Seed	5N-398 GT/CB/LL/RW	Bt CRW GLY LL	97	171	225	198	27.2
Anderson Seeds	622 VT3	Bt CRW GLY	98	164	191	177	27.5
Kruger	K-6298VT3	Bt CRW GLY	98	155	205	180	27.6
G2 Genetics	5H-999 RR/HX	Bt GLY LL	97	169	225	197	27.6
Proseed	897VT3	Bt CRW GLY	97	165	208	187	27.6
G2 Genetics	5X-999 RR/HXT	Bt CRW GLY LL	97	177	199	188	27.6
Dairyland	ST-9799	Bt CRW GLY	99	149	206	177	27.8
Wensman Seed	W 7270VT3	Bt CRW GLY	97	139	202	170	27.9
G2 Genetics	5H-700B RR/HX	Bt GLY LL	97	166	223	195	28.0
Kaltenberg	K4053VT3	Bt CRW GLY	97	154	204	179	28.3
Seeds 2000	2973GT/CB	Bt GLY	97	141	189	165	28.4
Kaltenberg	K4149LLGT3	GLY LL	98	148	201	174	28.4
Anderson Seeds	6043	—	98	141	213	177	28.6
Dairyland	ST-9597Q	Bt CRW GLY LL	97	144	231	187	28.6
NuTech Seed	3T-600 VT3	Bt CRW GLY	97	148	201	174	28.8
Kruger	K-6499VT3	Bt CRW GLY	99	148	215	182	28.9
Wensman Seed	W 7273VT3	Bt CRW GLY	98	148	200	174	29.6
Titan Pro	89X97	Bt CRW LL	97	139	202	170	29.8
Dairyland	ST-9500Q	Bt CRW GLY LL	99	130	227	178	30.0
G2 Genetics	5H-999B RR/HX	Bt GLY LL	97	185	221	203	30.0
NuTech Seed	3T-300 VT3	Bt CRW GLY	97	157	206	181	31.8
Blue River Hybrids	44R57	—	99	136	250	193	31.8
97 to 99 RM averages:				**158**	**212**	**185**	**27.7**
Later than 99 RM hybrids							
Dekalb	DKC52-59 (VT3)	Bt CRW GLY	102	170	208	189	25.6
Kruger	K-6200VT3	Bt CRW GLY	100	168	230	199	27.1
Dekalb	DKC50-66 (VT3)	Bt CRW GLY	100	169	230	200	27.1
Kruger	K-6102VT3	Bt CRW GLY	102	151	217	184	27.2
Renk	RK616VT3	Bt CRW GLY	100	133	205	169	27.6
Renk	RK594GTCBLLRW	Bt CRW GLY LL	100	176	210	193	27.7
Dekalb	DKC50-44 (VT3)	Bt CRW GLY	100	155	206	180	27.8
Proseed	8100GT	GLY	100	169	206	187	28.0
NuTech Seed	3T-601 VT3	Bt CRW GLY	101	164	214	189	28.2
G2 Genetics	5H-501 RR/HX	Bt GLY LL	101	159	235	197	28.3
Channel	200-22VT3	Bt CRW GLY	100	163	206	185	28.9
G2 Genetics	5H-702 RR/HX	Bt GLY LL	101	146	231	189	29.1
Pioneer Brand	36V53	Bt GLY	102	162	234	198	29.1
Proseed	9102VT3	Bt CRW GLY	102	153	209	181	29.3
Renk	RK698VT3	Bt CRW GLY	103	175	211	193	30.2
G2 Genetics	5X-802 RR/HXT	Bt CRW GLY LL	101	137	203	170	30.4
Kaltenberg	K5332GT	GLY	104	119	225	172	30.8
PFS	59CO2	Bt CRW GLY	102	159	207	183	30.8
Kruger	K-6401VT3	Bt CRW GLY	101	137	210	173	31.0
Renk	RK670VT3	Bt CRW GLY	103	149	205	177	31.0
NuTech Seed	1B-202 CB/LL	Bt LL	101	146	218	182	31.0
Blue River Hybrids	48B30	—	102	147	237	192	31.2
Hyland	HL CVR74	Bt CRW GLY	100	140	211	176	31.4
Titan Pro	87A03	Bt CRW GLY LL	103	149	225	187	31.5
Titan Pro	89A02GL	Bt CRW GLY LL	102	164	197	180	31.6
Dairyland	ST-9703Q	Bt CRW GLY LL	103	133	210	172	31.7
NuTech Seed	1N-001 CB/LL/RW	Bt CRW LL	101	152	205	179	31.8
Legacy	L-4009 HXTRR	Bt CRW GLY LL	101	126	211	168	32.6

Late maturity hybrids, central locations, 2009 (continued).

Source / Brand	Hybrid	Traits	Relative Maturity	Yield, Bushels/Acre at: Morris	Yield, Bushels/Acre at: Rosemount	Average Across Locations Bu/Acre	Average Across Locations % Moisture
Later than 99 RM hybrids (continued)							
NuTech Seed	3T-401 VT3	Bt CRW GLY	101	125	213	169	32.9
Pioneer Brand	35F44	Bt CRW GLY	105	125	225	175	33.6
Legacy	L-4258 VT3	Bt CRW GLY	102	157	225	191	33.6
Renk	RK686VT3	Bt CRW GLY	103	129	227	178	33.8
NuTech Seed	3T-302 VT3	Bt CRW GLY	101	126	216	171	33.9
NuTech Seed	3T-801 VT3	Bt CRW GLY	101	142	213	177	34.4
Later than 99 RM averages:				**149**	**216**	**183**	**30.3**
Central locations, late maturity averages:				**153**	**214**	**184**	**29.0**
LSD(0.20)				**26**	**17**	**15**	**1.4**

Northern locations, 2009.

Source / Brand	Hybrid	Traits	Relative Maturity	Yield, Bushels/Acre at: Rothsay	Yield, Bushels/Acre at: Staples	Yield, Bushels/Acre at: Crookston	Average Across Locations Bu/Acre	Average Across Locations % Moisture
82 and earlier RM hybrids								
Kruger	K-6378VT3	Bt CRW GLY	78	139	136	140	138	22.9
Wensman Seed	W 7083VT3	Bt CRW GLY	80	168	177	141	162	23.3
Kruger	K-2381RR/YGCB	Bt GLY	81	144	140	154	146	24.4
Dahlco	8781 RR	GLY	78	163	145	121	143	24.8
Dahlco	X-7085 VT3	Bt CRW GLY	80	189	166	168	174	25.2
NuTech Seed	3C-882 RR/YGCB	Bt GLY	82	153	149	145	149	25.5
Kaltenberg	K2615LLGTBt11	Bt GLY LL	82	163	167	135	155	26.1
Viking	0.89-80N	—	80	150	146	94	130	26.9
NuTech Seed	3T-083 VT3	Bt CRW GLY	82	165	140	130	145	27.9
G2 Genetics	5H-884 RR/HX	Bt GLY LL	82	171	155	138	155	28.3
Renk	RK212CBLL	Bt LL	82	194	154	155	168	29.7
NuTech Seed	1B-186 CB/LL	Bt LL	82	193	158	146	166	30.2
NuTech Seed	1B-183 CB/LL	Bt LL	82	179	170	131	160	30.3
NuTech Seed	3T-484 VT3	Bt CRW GLY	82	188	176	155	173	30.7
Dahlco	2146 conv	—	80	134	135	104	124	31.6
Proseed	781RRBT	Bt GLY	81	160	142	117	140	36.5
82 and earlier RM averages:				**166**	**153**	**136**	**152**	**27.8**
83 to 87 RM hybrids								
Kruger	K-6385VT3	Bt CRW GLY	85	179	174	144	166	22.3
Gold Country	84-03VT3	Bt CRW GLY	84	192	175	151	173	22.7
Pioneer Brand	39V07	Bt GLY	83	187	150	155	164	23.2
PFS	54M83	Bt CRW GLY	83	176	165	167	169	24.9
Hyland	HL R228	GLY	85	185	180	155	173	25.2
Channel	185-38R	GLY	85	177	155	134	156	25.5
Seeds 2000	2843RR	GLY	84	169	157	139	155	26.5
Dekalb	DKC35-19 (RR2/YGCB)	Bt GLY	85	176	165	150	164	26.7
Kruger	K-1286RR	GLY	86	187	170	156	171	27.1
Dyna-Gro Seed	52V01	Bt CRW GLY	87	200	174	164	179	27.1
Gold Country	87-01VT3	Bt CRW GLY	87	180	171	160	170	27.1
Hyland	HL R231	GLY	87	157	142	145	148	27.2
Dekalb	DKC36-34 (VT3)	Bt CRW GLY	86	179	165	159	168	27.5
Dahlman	D43-56 CBLL	Bt LL	86	192	171	149	171	27.7
PFS	56J86	Bt CRW GLY	86	176	181	179	178	27.9
Proseed	884VT3	Bt CRW GLY	84	153	137	122	137	28.3
Legacy	L-2850 VT3	Bt CRW GLY	87	199	166	174	180	28.7
Dahlco	8841 VT3	Bt CRW GLY	84	167	141	129	146	29.0
Dahlman	R42-26 CB	Bt GLY	84	162	151	136	150	29.3
Dahlman	R43-42 VT3	Bt CRW GLY	86	205	178	163	182	29.4
Wensman Seed	W 7089VT3	Bt CRW GLY	86	190	180	171	180	29.5
Proseed	787VT3	Bt CRW GLY	87	173	156	145	158	30.1
Dyna-Gro Seed	CX08287	Bt GLY LL	87	173	152	152	159	30.7
NuTech Seed	1N-887 CB/LL/RW	Bt CRW LL	86	172	156	143	157	31.5

Northern locations, 2009 (continued).

Source/ Brand	Hybrid	Traits	Relative Maturity	Yield, Bushels/Acre at:			Average Across Locations	
				Rothsay	Staples	Crookston	Bu/Acre	% Moisture
83 to 87 RM hybrids (continued)								
NuTech Seed	1B-290 CB/LL	Bt LL	87	175	171	115	154	31.7
Kaltenberg	K3039LLGTBt11	Bt GLY LL	87	173	164	146	161	31.7
Renk	RK302CBLL	Bt LL	87	191	153	162	169	31.8
Dairyland	ST-7985	Bt GLY LL	85	183	160	142	162	32.2
Dahlco	7871 GTCBLL	Bt GLY LL	87	157	147	139	147	32.2
NuTech Seed	1B-887 CB/LL	Bt LL	86	143	149	116	136	32.5
NuTech Seed	3C-889 RR/YGCB	Bt GLY	87	180	176	148	168	32.5
Renk	RK292GTCBLL	Bt GLY LL	85	158	155	132	148	33.3
Hyland	HL R220	GLY	85	166	150	129	148	33.6
Hyland	HL B34R	Bt GLY	86	186	168	131	161	33.6
Blue River Hybrids	25M90	—	86	164	153	121	146	33.8
NuTech Seed	3C-389 RR/YGCB	Bt GLY	87	173	146	138	153	34.1
Proseed	786CBLLRW	Bt CRW LL	86	170	142	136	149	34.8
Hyland	HL CVR36	Bt CRW GLY	86	161	139	118	139	35.0
PFS	37L84	Bt GLY	84	151	149	132	144	35.8
83 to 87 RM averages:				**175**	**160**	**145**	**160**	**29.6**
88 to 92 RM hybrids								
Channel	190-20R	GLY	90	179	163	136	159	27.3
Kruger	K-6388VT3	Bt CRW GLY	88	177	185	158	173	27.5
Dahlco	7881 RR	GLY	88	185	171	145	167	27.9
Hyland	HL CVR48	Bt CRW GLY	88	168	173	143	161	28.7
Kruger	K-2090RR/YGCB	Bt GLY	90	179	155	158	164	29.3
Kruger	K-6490VT3	Bt CRW GLY	90	190	163	160	171	29.3
Seeds 2000	8801VT3	Bt CRW GLY	88	197	175	153	175	29.7
Gold Country	89-09RR	GLY	89	190	158	158	168	31.2
Hyland	HL CVR44	Bt CRW GLY	88	177	140	131	149	31.5
PFS	68L91	Bt CRW GLY	91	165	165	148	159	31.5
PFS	92L90	Bt GLY LL	90	167	168	144	160	31.8
NuTech Seed	3T-493 VT3	Bt CRW GLY	92	176	151	128	152	31.8
Dairyland	ST-7789	Bt GLY	89	177	173	152	167	31.9
Dekalb	DKC40-20 (VT3)	Bt CRW GLY	90	187	164	142	165	32.0
Dekalb	DKC38-89 (VT3)	Bt CRW GLY	89	196	152	130	159	32.4
NuTech Seed	3T-390 VT3	Bt CRW GLY	90	189	156	142	162	32.6
NuTech Seed	3T-294 VT3	Bt CRW GLY	92	205	173	150	176	32.7
Dahlman	R45-25 VT3	Bt CRW GLY	90	171	165	138	158	32.8
Pioneer Brand	39N99	Bt GLY	89	184	157	134	158	32.8
Dairyland	ST-7790	Bt GLY LL	90	169	149	123	147	33.1
Renk	RK434RRYGCB	Bt GLY	92	177	186	145	169	33.6
Wensman Seed	W 7107VT3	Bt CRW GLY	90	174	163	151	162	33.8
Dairyland	ST-7891	Bt GLY LL	91	152	144	138	145	33.8
G2 Genetics	5X-591B RR/HXT	Bt CRW GLY LL	91	160	163	115	146	34.9
Dairyland	ST-6992	Bt GLY	92	190	169	129	163	35.0
NuTech Seed	3C-889A RR/YGCB	Bt GLY	89	171	170	135	158	35.1
Pioneer Brand	38H08	Bt GLY	92	207	136	147	164	35.3
Hyland	HL CVR54	Bt CRW GLY	92	183	180	146	170	35.6
Gold Country	92-03VT3	Bt CRW GLY	92	189	165	139	164	36.4
NuTech Seed	3P-191 RR/YGPL	Bt CRW GLY	91	180	150	113	148	36.5
G2 Genetics	5X-591 RR/HXT	Bt CRW GLY LL	91	145	146	113	135	36.7
NuTech Seed	5B-593 GT/CB/LL	Bt GLY LL	92	172	145	117	145	37.9
NuTech Seed	3T-393A VT3	Bt CRW GLY	92	195	167	128	163	38.6
NuTech Seed	3A-690 RR	GLY	90	160	136	99	132	39.8
Blue River Hybrids	30B19	—	90	167	147	95	137	43.0
Viking	0.99-90N	—	90	151	124	82	119	44.6
88 to 92 RM averages:				**178**	**160**	**135**	**158**	**33.6**
93 and later RM hybrids								
Dyna-Gro Seed	CX09892	GLY	93	210	174	150	178	30.1
Dekalb	DKC43-27 (VT3)	Bt CRW GLY	93	164	169	142	158	31.0
NuTech Seed	3T-894 VT3	Bt CRW GLY	93	180	150	137	156	32.7
NuTech Seed	3T-294A VT3	Bt CRW GLY	94	201	175	161	179	32.9

Northern locations, 2009 (continued).

Source / Brand	Hybrid	Traits	Relative Maturity	Yield, Bushels/Acre at: Rothsay	Staples	Crookston	Average Across Locations Bu/Acre	% Moisture
93 and later RM hybrids (continued)								
Channel	193-45R	GLY	93	174	146	120	147	33.9
Proseed	894VT3	Bt CRW GLY	94	176	180	142	166	35.5
NuTech Seed	3T-295 VT3	Bt CRW GLY	95	181	162	128	157	35.6
Kaltenberg	K3636LLRWBt11	Bt CRW LL	93	177	151	134	154	36.1
NuTech Seed	3P-494+ RR/YGPL	Bt GLY	93	172	161	128	153	36.1
Kruger	K-6093VT3	Bt CRW GLY	93	176	162	125	154	37.2
Dairyland	ST-9395	Bt GLY	95	173	165	142	160	38.0
NuTech Seed	3T-393 VT3	Bt CRW GLY	93	172	173	133	160	38.2
G2 Genetics	5H-797 RR/HX	Bt GLY LL	96	171	151	141	154	38.4
Proseed	793CBLLGT	Bt GLY LL	93	162	134	123	140	38.5
Dyna-Gro Seed	V3593VT3	Bt CRW GLY	95	189	155	137	160	38.7
Wensman Seed	W 8180VT3	Bt CRW GLY	95	162	140	142	148	38.7
NuTech Seed	3T-995 VT3	Bt CRW GLY	95	167	148	122	146	38.7
NuTech Seed	3P-995 RR/YGPL	Bt CRW GLY	95	167	144	125	146	39.0
Proseed	794CBLLGT	Bt GLY LL	94	164	126	103	131	39.0
NuTech Seed	3C-395 RR/YGCB	Bt GLY	95	169	137	126	144	39.6
G2 Genetics	5X-594 RR/HXT	Bt CRW GLY LL	93	129	142	98	123	40.4
NuTech Seed	1N-695 CB/LL/RW	Bt CRW LL	95	123	129	94	115	43.7
93 and Later RM averages:				**171**	**153**	**130**	**151**	**36.9**
Northern locations averages:				**174**	**158**	**137**	**156**	**32.0**
LSD(0.20)				**16**	**15**	**17**	**14**	**3.2**

Minnesota Agricultural Experiment Station
University of Minnesota

Varietal Trials Results

January 2010

Corn Silage

Craig Sheaffer and Doug Swanson

The Minnesota Hybrid Corn Silage Evaluation Program evaluates the silage potential of corn hybrids in Minnesota. The program's goal is to provide unbiased forage yield and quality information for educational and marketing programs.

The program is financed in part by entry fees from private seed companies that chose to enter hybrids for testing. These companies are listed in this publication. Results presented are from corn silage performance trials in regions of extensive corn silage use: southeastern, central, and west-central Minnesota. These locations are important dairy regions of Minnesota.

Test Sites

Silage hybrids entered in the southeast or central region trials were tested at two sites within each region. Hybrids entered in the west-central region were tested at one site. Sites within regions were as follows:

Southeast Dairy Region:
La Crescent, (Houston County)
Rochester (Olmsted County)

Central Dairy Region:
Paynesville (Stearns County)
Melrose (Stearns County)

West-Central Dairy Region:
Ottertail (Otter Tail County)

Test Procedure

Southeast and Central Regions

Design: Plots were established at La Crescent, Rochester, Paynesville and Melrose in randomized complete block designs with four replications. Hybrids were planted at 33,000 seed per acre with 30-inch row spacing. La Crescent and Rochester sites were planted on April 27 and April 24, respectively. The Central sites, Paynesville and Melrose, were both planted on May 7, 2009. Plant nutrients as manure or inorganic fertilizer were applied according to University of Minnesota recommendation. Weeds were controlled using standard cultivation and herbicide application practices.

Harvesting: Plots were harvested and whole-plant herbage sampled for dry matter and forage quality analysis.. Each site was harvested when the average whole-plant moisture across entries was estimated to be 65%. In 2009, harvest dates at La Crescent, Rochester, Paynesville and Melrose were September 18, September 23, September 24 and September 29, respectively.

West-Central Region

Design: Plots near Ottertail were established May 5 under center-pivot irrigation in a randomized complete block design with three replications. Hybrids were planted at 35,700 seeds per acre with 30-inch row spacing. Fertilizer was fall-applied liquid manure at 8,000 gallons per acre plus 150 pounds of urea in 2009. Pre-emergent herbicide was applied to control weeds.

Harvesting: Plots were harvested and whole-plant herbage sampled for yield and forage quality analysis on September 30.

Companies participating in 2009 hybrid corn silage performance trials.

AgriGold Hybrids	www.agrigold.com
Anderson Seeds	37825 County Rd 63, St Peter, MN 56082
Channel Seeds	www.monsanto.com
Dahlco Seeds	www.dahlcoseeds.com
Dairyland Seed Co, Inc.	www.dairylandseed.com
Dekalb (Monsanto Co)	www.dekalb.com
Dyna-Gro Seeds	www.dynagroseed.com
G2 Genetics	www.yieldleader.com
Hyland Seeds	www.hylandseeds.com
Legacy Seeds, Inc.	www.legacyseeds.com
Mycogen Seeds	www.mycogen.com
Nu Tech Seed Co.	www.yieldleader.com
Pioneer Hi-Bred International	www.pioneer.com
Producers Hybrids	www.producershybrids.com
Renk Seed Co.	www.renkseed.com
Trelay Seeds	www.trelay.com
Wensman Seed Co.	www.wensmanseed.com

Results Provided

Tables 1-5 summarize hybrid yield and forage quality results from La Crescent, Rochester, Paynesville, Melrose and Ottertail, respectively. Hybrid trait information is supplied by companies entered in the hybrid corn silage trial. Moisture content, whole-plant dry matter (DM) yield and silage yield are listed, and hybrids are ranked in descending order of milk yield per acre (Milk Yield, lb/acre). Whole-plant forage quality traits listed include crude protein (CP), neutral detergent fiber (NDF), 48-hour *in vitro* digestibility (IVD), 48-hour neutral

detergent fiber digestibility (NDFD), and starch concentration. With the exception of NDFD, all forage quality traits are expressed as a percent of dry matter. NDFD is expressed as a percent of NDF.

Milk production potentials per ton (lb milk/ton forage) and per acre (lb milk/acre forage) of forage were calculated using the MILK2006 spreadsheet developed by the University of Wisconsin. MILK2006 approximates animal performance based on a standard cow weight and milk production level (1,350-lb body weight and 90 lb/day at 3.8% fat). Field values for moisture and DM yield at harvest; laboratory values for CP, NDF, NDFD, starch, oil and ash concentration; and book values for NDFCP (1.3%) were used for spreadsheet calculations. For MILK2006 predictions, we assumed that kernel processing occurred. Milk production (lb milk/ton and lb milk/acre) values can be used as a quick reference for relative comparison of hybrids within test locations.

How To Use Results

NDF is a negative indicator of forage intake potential; higher NDF concentration generally implies lower animal performance potential. IVD provides an estimate of forage dry matter digestibility, and NDFD estimates digestibility of the fiber fraction. Starch concentration is positively associated with digestibility because it is assumed to be 100% digestible. Relatively higher IVD, NDFD and/or starch concentrations generally imply greater animal performance potential. Milk yield per acre represents the combined effects of yield and quality.

Corn hybrids differed in yield, forage quality, and milk production potential at all sites. Means and least significant difference (LSD) values at the 10% probability level are shown for each parameter at each site. Where the difference between two hybrids for a particular yield or quality trait is greater than the LSD value, there is a 90% probability that there is a significant difference between the two hybrids for that parameter (i.e. moisture, yield, quality concentration, or milk production).

Test Plot Research

Test plot establishment and management were supervised by T.R. Hoverstad, M.D. Bickell, L.M. Behnken, F.R. Breitenbach, D.L. Holen and P. Glogoza.

Table 1. Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield and quality traits for corn hybrids planted at La Crescent (Houston County) in 2009.

			Moist	Yield, Ton/Acre [2]		Quality (Concentration), % [3]					Milk Yield [4]	
Brand / Hybrid Entry	Traits [1]	RM	%	DM	Silage	CP	NDF	IVD	NDFD	Starch	Lb/ Ton	Lb/ Acre
Mycogen/ TMF2Q716	Bt,CRW,GLY,LL	109	66.2	13.1	38.6	7.5	41	80	48	36	3,160	41,400
AgriGold Hybrids/ A6439VT3	Bt,CRW,GLY	109	68.6	12.4	39.4	8.2	41	79	49	36	3,230	40,000
Legacy Seeds Inc/ L-5350 GTCBLL	Bt,GLY,LL	104	63.7	11.8	32.4	6.8	37	81	49	41	3,360	39,600
Dekalb/ DKC53-41(VT3)	Bt, CRW, GLY	103	60.4	12.5	31.5	6.7	40	79	49	38	3,150	39,200
Dekalb/ DKC59-64(VT3)	Bt, CRW, GLY	109	68.1	12.2	38.2	6.9	41	79	49	37	3,220	39,200
Legacy Seeds Inc/ L-5309 GT	GLY	104	65.9	11.7	34.2	6.9	38	81	49	39	3,340	39,000
Renk/ RK829VT3	Bt, CRW, GLY	112	68.0	12.0	37.6	7.4	40	78	47	38	3,230	38,800
Renk/ RK711RRHXTRA	Bt,CRW,GLY,LL	107	68.9	12.5	40.1	7.4	43	79	48	35	3,090	38,500
Trelay/ 6VT981	Bt,CRW,GLY	107	66.8	11.5	34.6	7.4	38	79	48	40	3,340	38,400
Producers Hybrids/ 7325 VT3	Bt, CRW, GLY	113	70.4	12.0	40.6	7.8	42	79	47	36	3,150	37,900
Legacy Seeds Inc/ L-6609 HXTRR	Bt,CRW.GLY,LL	108	69.4	12.0	39.3	7.1	41	80	47	36	3,140	37,700
Pioneer Brand/ 34A89	Bt, CRW, GLY	110	67.8	11.9	37.0	7.4	41	79	48	35	3,150	37,600
Dekalb/ DKC61-69(VT3)	Bt, CRW, GLY	111	66.8	11.6	34.8	7.4	40	80	48	37	3,240	37,500
Anderson Seeds/ 103R	GLY	102	65.0	11.3	32.2	7.5	39	81	49	38	3,290	37,100
Renk/ RK844VT3	Bt, CRW, GLY	111	68.9	11.5	36.9	7.4	41	79	48	36	3,180	36,400
Channel/ 210-61VT3 Brand	Bt, CRW, GLY	110	68.2	11.7	36.8	7.3	42	78	48	35	3,110	36,300
G2 Genetics/ 5X-909 RR/HXT	Bt,CRW,GLY,LL	109	68.0	11.7	36.5	7.8	42	79	48	35	3,110	36,300
Channel/ 209-77VT3 Brand	Bt, CRW, GLY	109	67.3	10.9	33.2	7.5	39	79	50	38	3,310	36,000
Mycogen/ TMF2Q759	Bt,CRW,GLY,LL	113	71.0	11.7	40.3	7.3	43	78	48	33	3,080	36,000
NuTech Seed/ 5N-809 GT/CB/LL	Bt,CRW,GLY,LL	109	69.3	11.4	37.2	7.0	42	79	48	34	3,140	35,800
Renk/ RK744VT3	Bt, CRW, GLY	107	67.1	11.3	34.3	7.1	41	79	47	37	3,160	35,600
NuTech Seed/ 3T-013 VT3	Bt, CRW, GLY	113	68.6	10.8	34.5	7.5	39	79	48	38	3,280	35,500
Mycogen/ TMF2R521	Bt,CRW,GLY	98	65.4	10.7	31.0	7.2	39	80	47	39	3,260	35,000
AgriGold Hybrids/ A6309VT3	Bt,CRW,GLY	103	67.6	10.7	33.0	6.6	39	80	47	39	3,250	34,800
Anderson Seeds/ 103 VT3	Bt, CRW, GLY	103	66.5	10.6	31.8	7.1	40	80	49	38	3,260	34,700
Trelay/ 7T231	Bt,CRW,GLY	111	69.1	10.6	34.4	7.1	40	79	48	38	3,250	34,500
AgriGold Hybrids/ A6323CL	CL	103	66.7	10.5	31.6	6.7	41	80	49	36	3,230	34,100
AgriGold Hybrids/ A6459VT3	Bt,CRW,GLY	110	69.7	10.6	35.0	7.4	41	80	47	37	3,170	33,600
Trelay/ 6T226	Bt,CRW,GLY	106	66.1	10.5	31.1	7.0	42	79	48	36	3,130	33,000
Wensman Seed/ W 7562VT3	Bt, CRW, GLY	111	70.2	10.2	34.3	7.5	41	79	48	37	3,220	32,900
Dekalb/ DKC50-44(VT3)	Bt, CRW, GLY	100	67.5	10.0	30.7	7.2	40	79	49	38	3,290	32,800
Dekalb/ DKC57-50(VT3)	Bt, CRW, GLY	107	66.9	10.5	31.7	6.2	43	79	48	36	3,110	32,700
NuTech Seed/ 3T-413 VT3	Bt, CRW, GLY	113	69.2	10.4	33.8	7.1	42	79	48	35	3,140	32,700
AgriGold Hybrids/ A6279VT3	Bt,CRW,GLY	101	68.7	10.2	32.8	7.5	42	78	48	36	3,160	32,400
Mycogen/ 2W587	Bt,CRW,GLY,LL	104	68.4	10.0	31.8	8.2	42	79	47	37	3,120	31,300
Trelay/ 5T429	Bt,CRW,GLY	102	67.6	9.9	30.6	7.3	42	79	49	35	3,160	31,300

Table 1 (continued). Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield and quality traits for corn hybrids planted at La Crescent (Houston County) in 2009.

Brand / Hybrid Entry	Traits [1]	RM	Moist	Yield, Ton/Acre [2]		Quality (Concentration), % [3]					Milk Yield [4]	
			%	DM	Silage	CP	NDF	IVD	NDFD	Starch	Lb/ Ton	Lb/ Acre
Channel/ 207-07VT3 Brand	Bt, CRW, GLY	107	69.1	10.0	32.2	7.5	42	80	47	36	3,110	31,000
Producers Hybrids/ 7077 VT3	Bt, CRW, GLY	110	72.1	10.1	36.1	8.0	43	80	47	33	3,010	30,300
Pioneer Brand/ 33D14	Bt, CRW, GLY	113	69.3	9.8	31.8	7.4	44	78	48	33	3,040	29,700
Wensman Seed/ W 7455VT3	Bt, CRW, GLY	107	69.8	9.6	31.8	7.6	42	79	47	35	3,090	29,700
Dekalb/ DKC55-07(VT3)	Bt, CRW, GLY	105	64.3	10.2	28.5	7.4	43	74	47	36	2,900	29,500
Dekalb/ DKC54-49(VT3)	Bt, CRW, GLY	104	69.6	8.6	28.1	7.2	43	79	48	35	3,090	26,400
Mean	—	—	67.8	11.0	34.3	7.3	41	79	48	37	3,180	35,000
LSD(0.10)	—	—	3.4	1.6	3.4	0.4	ns	ns	2	ns	ns	5,400
CV	—	—	4.3	12.5	8.3	4.8	7.2	2.3	2.9	9.5	6.3	13.1

[1] Bt, CRW, GLY, LL, Lf traits contain genes for European corn borer tolerance, corn rootworm tolerance, and glyphosate, Liberty LinkR (glufosinate-ammonium) herbicide resistance, and leafy trait, respectively.

[2] DM yield is whole-plant corn yield at 100% dry matter; Silage yield is whole-plant corn yield at harvest moisture.

[3] Quality concentration expressed as a % of DM, except NDFD which is expressed as a % of NDF. Refer to Results Provided text for additional information.

[4] Milk production was estimated using spreadsheet MILK2006 developed at the University of Wisconsin. Refer to Results Provided text for additional information.

Table 2. Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield and quality traits for corn hybrids planted at Rochester (Olmsted County) in 2009.

Brand / Hybrid Entry	Traits [1]	RM	Moist	Yield, Ton/Acre [2]		Quality (Concentration), % [3]					Milk Yield [4]	
			%	DM	Silage	CP	NDF	IVD	NDFD	Starch	Lb/ Ton	Lb/ Acre
Channel/ 209-77VT3 Brand	Bt, CRW, GLY	109	69.0	10.8	34.8	7.5	44	78	49	35	3,090	33,400
AgriGold Hybrids/ A6323CL	CL	103	69.3	10.4	33.7	6.4	41	79	49	37	3,200	33,100
AgriGold Hybrids/ A6309VT3	Bt,CRW,GLY	103	68.0	10.4	32.3	6.4	41	78	47	39	3,160	32,800
AgriGold Hybrids/ A6439VT3	Bt,CRW,GLY	109	69.7	11.3	37.4	7.3	46	76	47	32	2,900	32,800
Channel/ 210-61VT3 Brand	Bt, CRW, GLY	110	70.1	11.0	36.8	7.2	46	77	50	32	2,980	32,700
Trelay/ 7T231	Bt,CRW,GLY	111	70.2	10.6	35.7	7.4	43	78	47	35	3,010	31,900
Pioneer Brand/ 34A89	Bt, CRW, GLY	110	71.2	10.7	37.0	7.2	47	77	50	31	2,960	31,500
Mycogen/ TMF2Q716	Bt,CRW,GLY,LL	109	70.1	10.3	34.3	7.5	46	77	48	33	2,960	30,400
Trelay/ 6VT981	Bt,CRW,GLY	107	70.6	9.8	33.5	7.4	42	79	48	35	3,090	30,300
NuTech Seed/ 3T-413 VT3	Bt, CRW, GLY	113	70.2	10.0	33.5	6.7	44	78	46	35	2,990	29,900
Channel/ 207-07VT3 Brand	Bt, CRW, GLY	107	70.2	9.7	32.6	7.4	43	77	48	36	3,060	29,700
Pioneer Brand/ 33D14	Bt, CRW, GLY	113	69.9	10.1	33.6	7.3	47	76	48	31	2,870	29,000
Anderson Seeds/ 103R	GLY	102	68.4	9.7	30.9	7.0	46	77	48	32	2,960	28,800
Dekalb/ DKC53-41(VT3)	Bt, CRW, GLY	103	70.5	9.5	32.1	7.3	45	77	49	34	3,040	28,800
Renk/ RK844VT3	Bt, CRW, GLY	111	71.2	9.4	32.7	7.3	43	78	48	34	3,060	28,800
Dekalb/ DKC57-50(VT3)	Bt, CRW, GLY	107	68.8	9.4	30.2	6.0	45	76	49	34	3,050	28,700
Producers Hybrids/ 7325 VT3	Bt, CRW, GLY	113	70.7	9.8	33.4	7.3	46	77	48	31	2,920	28,700
AgriGold Hybrids/ A6279VT3	Bt,CRW,GLY	101	68.5	9.2	29.1	7.4	44	78	50	35	3,110	28,600
Dekalb/ DKC59-64(VT3)	Bt, CRW, GLY	109	69.6	10.1	33.3	7.0	47	75	47	30	2,820	28,500
Anderson Seeds/ 103 VT3	Bt, CRW, GLY	103	68.5	9.1	28.9	7.2	43	78	48	36	3,110	28,300
Renk/ RK744VT3	Bt, CRW, GLY	107	71.3	9.0	31.5	6.9	42	79	48	36	3,120	28,200
Producers Hybrids/ 7077 VT3	Bt, CRW, GLY	110	71.4	9.3	32.6	7.8	45	78	49	33	3,020	28,100
Dekalb/ DKC55-07(VT3)	Bt, CRW, GLY	105	68.7	8.8	28.3	7.1	42	79	49	37	3,160	27,900
Renk/ RK829VT3	Bt, CRW, GLY	112	71.4	9.5	33.3	7.1	47	76	49	30	2,920	27,900
Legacy Seeds Inc/ L-6609 HXTRR	Bt,CRW.GLY,LL	108	72.0	9.5	34.0	7.4	47	76	49	31	2,900	27,500
Mycogen/ 2W587	Bt,CRW,GLY,LL	104	70.0	9.1	30.3	6.9	45	77	48	34	3,020	27,500
Legacy Seeds Inc/ L-5350 GTCBLL	Bt,GLY,LL	104	71.3	8.8	30.6	6.6	43	79	49	36	3,130	27,400
Dekalb/ DKC61-69(VT3)	Bt, CRW, GLY	111	70.0	9.2	30.6	7.5	45	77	48	33	2,970	27,300
G2 Genetics/ 5X-909 RR/HXT	Bt,CRW,GLY,LL	109	71.1	9.1	31.6	7.5	46	77	49	32	2,980	27,100
Mycogen/ TMF2Q759	Bt,CRW,GLY,LL	113	72.3	9.9	35.6	7.2	50	76	49	25	2,740	27,100
NuTech Seed/ 3T-013 VT3	Bt, CRW, GLY	113	71.8	9.0	32.0	7.7	46	77	50	32	2,940	26,400
Renk/ RK711RRHXTRA	Bt,CRW,GLY,LL	107	71.0	8.8	30.4	7.2	47	76	48	32	2,930	25,800
Trelay/ 6T226	Bt,CRW,GLY	106	70.2	8.9	30.0	6.7	49	75	49	30	2,870	25,600
Dekalb/ DKC50-44(VT3)	Bt, CRW, GLY	100	68.4	8.3	26.3	6.6	45	77	49	35	3,040	25,300
Mycogen/ TMF2R521	Bt,CRW,GLY	98	71.2	8.1	28.1	7.2	43	78	49	35	3,110	25,200
Legacy Seeds Inc/ L-5309 GT	GLY	104	71.4	8.2	28.7	7.2	45	77	50	34	3,040	25,000
Trelay/ 5T429	Bt,CRW,GLY	102	69.9	8.2	27.3	6.9	46	77	49	33	2,980	24,500
NuTech Seed/ 5N-809 GT/CB/LL	Bt,CRW,GLY,LL	109	71.6	8.4	29.5	6.9	47	76	48	30	2,870	24,000
Wensman Seed/ W 7562VT3	Bt, CRW, GLY	111	72.8	8.4	30.7	7.6	47	77	48	31	2,860	23,900
Wensman Seed/ W 7455VT3	Bt, CRW, GLY	107	72.0	8.2	29.2	7.4	45	77	47	32	2,900	23,800

Table 2 (continued). Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield and quality traits for corn hybrids planted at Rochester (Olmsted County) in 2009.

Brand / Hybrid Entry	Traits [1]	RM, Rating	Moist %	Yield, Ton/Acre [2]		Quality (Concentration), % [3]					Milk Yield [4]	
				DM	Silage	CP	NDF	IVD	NDFD	Starch	Lb/ Ton	Lb/ Acre
AgriGold Hybrids/ A6459VT3	Bt,CRW,GLY	110	72.1	7.9	28.4	7.3	45	78	47	33	2,960	23,400
Dekalb/ DKC54-49(VT3)	Bt, CRW, GLY	104	70.4	7.7	26.1	6.9	45	77	48	34	2,980	23,100
Mean	—	—	70.4	9.4	31.7	7.1	45	77	48	33	2,990	28,100
LSD(0.10)	—	—	2.1	1.5	4.4	0.6	2	1	2	3	130	5,000
CV	—	—	2.6	13.8	12.0	7.1	4.2	1.4	2.8	6.7	3.6	15.2

[1] Bt, CRW, GLY, LL, Lf traits contain genes for European corn borer tolerance, corn rootworm tolerance, and glyphosate, Liberty LinkR (glufosinate-ammonium) herbicide resistance, and leafy trait, respectively.

[2] DM yield is whole-plant corn yield at 100% dry matter; Silage yield is whole-plant corn yield at harvest moisture.

[3] Quality concentration expressed as a % of DM, except NDFD which is expressed as a % of NDF. Refer to Results Provided text for additional information.

[4] Milk production was estimated using spreadsheet MILK2006 developed at the University of Wisconsin. Refer to Results Provided text for additional information.

Table 3. Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield and quality traits for corn hybrids planted at Paynesville (Stearns County) in 2009.

Brand / Hybrid Entry	Traits [1]	RM	Moist %	Yield, Ton/Acre [2]		Quality (Concentration), % [3]					Milk Yield [4]	
				DM	Silage	CP	NDF	IVD	NDFD	Starch	Lb/ Ton	Lb/ Acre
Legacy Seeds Inc/ L-5350 GTCBLL	Bt,GLY,LL	104	68.6	10.0	31.7	7.1	39	80	48	41	3,290	32,800
Dyna-Gro/ V4592VTNS	Bt, CRW, GLY	105	72.9	10.5	38.9	9.2	43	79	47	36	3,080	32,500
Trelay/ 6VT981	Bt,CRW,GLY	107	70.1	9.8	32.6	7.8	40	79	47	40	3,200	31,200
Dekalb/ DKC53-41 (VT3)	Bt, CRW, GLY	103	68.9	10.1	32.4	7.1	44	77	47	36	3,040	30,600
Dekalb/ DKC55-07 (VT3)	Bt, CRW, GLY	105	68.0	9.3	29.1	8.0	41	79	49	41	3,260	30,400
Dahlco/ 8041 GTCBLL	Bt,GLY,LL	104	68.3	9.5	29.8	7.2	41	78	47	39	3,180	30,100
Dekalb/ DKC52-59 (VT3)	Bt, CRW, GLY	102	70.7	9.4	32.0	7.0	41	79	48	39	3,190	29,900
Renk/ RK698VT3	Bt, CRW, GLY	103	69.0	9.6	30.9	7.1	43	78	47	37	3,090	29,500
Renk/ RK692GTCBLLRW	Bt,CRW,GLY,LL	105	71.3	9.7	33.8	8.7	42	79	45	37	3,050	29,500
Dekalb/ DKC50-44 (VT3)	Bt, CRW, GLY	100	69.3	9.2	29.9	7.1	40	80	47	39	3,200	29,300
Dekalb/ DKC59-64 (VT3)	Bt, CRW, GLY	109	73.6	10.2	38.6	7.2	46	76	46	32	2,880	29,300
Legacy Seeds Inc/ L-5309 GT	GLY	104	72.7	8.7	31.8	7.4	39	80	49	40	3,320	28,800
Wensman Seed/ W 7433VT3	Bt, CRW, GLY	105	69.9	9.4	31.1	7.3	42	78	46	38	3,070	28,800
Mycogen/ 2W587	Bt,CRW,GLY,LL	104	70.1	9.4	31.6	7.9	42	78	44	38	3,030	28,500
Channel/ 201-13VT3 Brand	Bt, CRW, GLY	105	70.3	9.0	30.3	7.5	42	79	49	36	3,150	28,400
Mycogen/ TMF2Q716	Bt,CRW,GLY,LL	109	71.6	10.3	36.2	7.7	47	76	43	32	2,760	28,400
Hyland Seeds/ HL SR59	GLY	101	73.8	9.8	37.5	7.7	46	77	46	31	2,880	28,300
Channel/ 200-22VT3 Brand	Bt, CRW, GLY	100	70.0	9.0	29.9	7.2	42	79	47	38	3,120	28,100
Dekalb/ DKC50-66 (VT3)	Bt, CRW, GLY	100	70.0	9.1	30.5	7.3	43	77	48	37	3,070	28,000
Trelay/ 5T128	Bt,CRW,GLY	101	69.7	8.8	29.2	7.7	40	79	46	39	3,160	27,900
Trelay/ 5T429	Bt,CRW,GLY	102	70.0	8.9	29.7	8.0	42	79	48	38	3,120	27,800
Producers Hybrids/ 6464 VT3	Bt, CRW, GLY	104	72.3	9.5	34.4	7.5	45	76	46	33	2,880	27,400
NuTech Seed/ 3T-098 VT3	Bt, CRW, GLY	96	70.3	9.2	31.0	7.8	44	76	45	37	2,960	27,300
Dekalb/ DKC61-69 (VT3)	Bt, CRW, GLY	111	72.4	9.5	34.3	7.8	45	77	45	34	2,880	27,200
NuTech Seed/ 5X-100 RR/HXT	Bt,CRW,GLY,LL	100	72.5	9.3	33.7	8.1	44	78	46	34	2,940	27,200
Pioneer Brand/ 35F40	Bt,GLY	105	71.1	9.1	31.5	8.1	45	77	47	35	2,990	27,200
Dyna-Gro/ 55R10	Bt,CRW,GLY,LL	101	72.3	9.0	32.6	7.8	43	78	45	36	2,980	26,900
Pioneer Brand/ 34A89	Bt, CRW, GLY	110	72.9	9.9	36.5	7.7	49	75	46	29	2,720	26,900
Wensman Seed/ W 7455VT3	Bt, CRW, GLY	107	73.8	8.8	33.5	8.0	44	78	47	34	2,980	26,200
Dekalb/ DKC55-64 (VT3)	Bt, CRW, GLY	105	69.7	8.6	28.4	8.2	45	77	46	37	2,980	25,600
NuTech Seed/ 3T-600 VT3	Bt, CRW, GLY	97	71.3	8.7	30.4	7.2	46	76	45	35	2,880	25,200
Pioneer Brand/ 36V53	Bt,GLY	102	71.1	8.0	27.8	8.0	42	78	47	37	3,100	24,900
Dekalb/ DKC48-37 (VT3)	Bt, CRW, GLY	98	67.1	7.9	24.1	7.4	41	78	45	40	3,080	24,400
Hyland Seeds/ HL SVT50	Bt,CRW,GLY	100	70.1	8.8	29.5	7.7	46	75	42	34	2,770	24,400
Producers Hybrids/ 5684 VT3	Bt, CRW, GLY	96	70.5	8.0	27.2	7.6	44	76	46	37	3,000	24,100
Dekalb/ DKC54-49 (VT3)	Bt, CRW, GLY	104	73.2	7.8	29.1	8.0	45	77	48	35	3,040	23,700
Dyna-Gro/ V3593VT3	Bt, CRW, GLY	95	69.0	7.8	25.2	7.0	45	76	44	36	2,880	22,600
NuTech Seed/ 3T-295 VT3	Bt, CRW, GLY	95	66.3	7.3	21.6	7.5	43	78	46	39	3,030	22,100
Trelay/ 2RR530	GLY	86	64.2	7.2	20.2	7.0	42	77	47	35	2,950	21,300
Mean	—	—	70.5	9.1	31.0	7.6	43	78	46	36	3,030	27,500
LSD(0.10)	—	—	2.7	1.3	3.3	0.5	4	2	2	4	210	4,900
CV	—	—	3.3	12.4	9.0	6.4	7.0	2.3	4.1	10.2	5.9	15.3

[1] CB, CRW, GLY, LL traits contain genes for European corn borer tolerance, corn rootworm tolerance, and glyphosate and Liberty Link R (glufosinate-ammonium) herbicide resistance, respectively.

[2] DM yield is whole-plant corn yield at 100% dry matter; Silage yield is whole-plant corn yield at harvest moisture.

[3] Quality concentration expressed as a % of DM, except NDFD which is expressed as a % of NDF. Refer to Results Provided text for additional information.

[4] Milk production was estimated using spreadsheet MILK2006 developed at the University of Wisconsin. Refer to Results Provided text for additional information.

Table 4. Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield and quality traits for corn hybrids planted at Melrose, (Stearns County) in 2009.

Brand / Hybrid Entry	Traits [1]	RM	Moist	Yield, Ton/Acre [2]		Quality (Concentration), % [3]					Milk Yield [4]	
			%	DM	Silage	CP	NDF	IVD	NDFD	Starch	Lb/ Ton	Lb/ Acre
Dekalb/ DKC61-69 (VT3)	Bt, CRW, GLY	111	63.9	9.7	26.8	7.7	40	81	48	37	3,150	30,400
Dekalb/ DKC50-44 (VT3)	Bt, CRW, GLY	100	61.0	9.1	23.3	7.4	39	82	51	40	3,250	29,500
Dekalb/ DKC53-41 (VT3)	Bt, CRW, GLY	103	62.0	8.8	23.2	8.2	38	82	50	40	3,300	29,100
Wensman Seed/ W 7433VT3	Bt, CRW, GLY	105	63.1	9.0	24.3	7.7	38	82	50	39	3,240	29,100
Trelay/ 6VT981	Bt,CRW,GLY	107	66.4	8.8	26.2	8.4	39	82	50	39	3,300	29,000
Pioneer Brand/ 35F40	Bt, GLY	105	66.0	8.7	25.7	7.9	39	81	49	39	3,290	28,700
Mycogen/ 2W587	Bt,CRW,GLY,LL	104	64.3	8.9	24.9	8.4	40	82	49	37	3,210	28,500
NuTech Seed/ 3T-295 VT3	Bt, CRW, GLY	95	56.4	8.4	19.2	7.8	35	84	51	44	3,250	27,200
Trelay/ 5T128	Bt,CRW,GLY	101	61.6	8.6	22.4	8.0	39	81	50	38	3,170	27,200
Dahlco/ 8041 GTCBLL	Bt, GLY, LL	104	61.9	8.6	22.5	7.0	40	81	48	37	3,160	27,000
Dyna-Gro/ V4592VTNS	Bt, CRW, GLY	105	66.3	8.3	24.6	8.7	39	82	49	37	3,250	27,000
Hyland Seeds/ HL SR59	GLY	101	67.5	8.6	26.4	8.1	43	81	51	32	3,120	26,800
Legacy Seeds Inc/ L-5350 GTCBLL	Bt,GLY,LL	104	65.5	7.8	22.6	7.0	39	82	52	38	3,330	25,900
Dyna-Gro/ 55R10	Bt,CRW,GLY,LL	101	67.3	8.0	24.5	7.9	42	81	50	34	3,160	25,300
Mycogen/ TMF2Q716	Bt,CRW,GLY,LL	109	65.7	8.3	24.2	7.5	45	78	49	31	2,980	24,700
Dekalb/ DKC52-59 (VT3)	Bt, CRW, GLY	102	65.9	7.6	22.2	7.8	39	81	49	39	3,250	24,600
Producers Hybrids/ 5684 VT3	Bt, CRW, GLY	96	62.4	7.6	20.2	8.5	38	82	49	40	3,230	24,600
NuTech Seed/ 5X-100 RR/HXT	Bt,CRW,GLY,LL	100	66.2	7.6	22.4	8.0	40	82	48	37	3,230	24,400
Dekalb/ DKC55-64 (VT3)	Bt, CRW, GLY	105	62.2	7.7	20.3	7.9	41	80	51	37	3,160	24,300
Pioneer Brand/ 34A89	Bt, CRW, GLY	110	66.1	7.9	23.2	8.5	44	80	52	31	3,090	24,300
Channel/ 200-22VT3 Brand	Bt, CRW, GLY	100	68.1	7.5	23.5	7.9	40	82	50	38	3,220	24,100
Dekalb/ DKC59-64 (VT3)	Bt, CRW, GLY	109	65.4	7.7	22.3	7.7	43	80	53	32	3,120	24,100
Wensman Seed/ W 7455VT3	Bt, CRW, GLY	107	69.6	7.6	24.9	8.6	41	81	51	34	3,170	24,000
Channel/ 201-13VT3 Brand	Bt, CRW, GLY	105	66.4	7.5	22.2	7.7	40	81	49	36	3,190	23,900
Dekalb/ DKC50-66 (VT3)	Bt, CRW, GLY	100	63.7	7.2	19.9	7.5	38	82	49	40	3,270	23,600
NuTech Seed/ 3T-600 VT3	Bt, CRW, GLY	97	63.1	7.5	20.4	7.5	41	81	49	36	3,110	23,400
Producers Hybrids/ 6464 VT3	Bt, CRW, GLY	104	66.1	7.5	22.1	7.2	43	79	50	34	3,120	23,400
Dekalb/ DKC55-07 (VT3)	Bt, CRW, GLY	105	62.0	7.3	19.1	7.8	39	81	51	37	3,210	23,300
NuTech Seed/ 3T-098 VT3	Bt, CRW, GLY	96	66.0	7.1	20.8	8.8	39	81	51	39	3,270	23,100
Hyland Seeds/ HL B337	Bt,GLY	108	65.9	7.2	21.2	8.6	41	81	50	34	3,170	22,900
Dekalb/ DKC54-49 (VT3)	Bt, CRW, GLY	104	67.3	7.4	22.6	7.8	44	80	51	31	3,050	22,600
Renk/ RK692GTCBLLRW	Bt,CRW,GLY,LL	105	63.5	7.0	19.1	8.0	39	81	48	39	3,230	22,600
Dyna-Gro/ V3593VT3	Bt, CRW, GLY	95	64.1	7.0	19.5	7.9	40	81	50	37	3,210	22,500
Hyland Seeds/ HL SVT50	Bt,CRW,GLY	100	66.5	7.3	21.8	7.8	43	79	49	34	3,080	22,500
Trelay/ 5T429	Bt,CRW,GLY	102	66.4	7.2	21.5	7.7	43	79	50	33	3,090	22,300
Renk/ RK698VT3	Bt, CRW, GLY	103	66.1	6.8	19.9	8.0	41	81	50	35	3,150	21,300
Pioneer Brand/ 36V53	Bt ,GLY	102	65.3	6.6	19.0	7.7	40	80	49	38	3,200	21,100
Legacy Seeds Inc/ L-5309 GT	GLY	104	67.1	6.7	20.5	7.9	43	80	50	33	3,120	21,000
Trelay/ 2RR530	GLY	86	59.9	6.7	16.6	8.5	41	80	51	36	3,060	20,400
Dekalb/ DKC48-37 (VT3)	Bt, CRW, GLY	98	64.6	6.1	17.3	7.7	41	81	49	36	3,130	19,100
Mean	—	—	64.7	7.8	22.1	7.9	40	81	50	36	3,180	24,700
LSD(0.10)	—	—	3.5	1.5	3.6	0.6	3	2	ns	4	150	5,000
CV	—	—	4.7	16.6	14.2	7.1	6.9	1.7	4.2	10.3	4.0	17.3

[1] CB, CRW, GLY, LL traits contain genes for European corn borer tolerance, corn rootworm tolerance, and glyphosate and Liberty Link R (glufosinate-ammonium) herbicide resistance, respectively.

[2] DM yield is whole-plant corn yield at 100% dry matter; Silage yield is whole-plant corn yield at harvest moisture.

[3] Quality concentration expressed as a % of DM, except NDFD which is expressed as a % of NDF. Refer to Results Provided text for additional information.

[4] Milk production was estimated using spreadsheet MILK2006 developed at the University of Wisconsin. Refer to Results Provided text for additional information.

Table 5. Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield and quality traits for corn hybrids planted at Ottertail (Otter Tail County) in 2009.

Brand / Hybrid Entry	Traits [1]	RM	Moist	Yield, Ton/Acre [2]		Quality (Concentration), % [3]					Milk Yield [4]	
			%	DM	Silage	CP	NDF	IVD	NDFD	Starch	Lb/ Ton	Lb/ Acre
Pioneer Brand/ 35F44	Bt, CRW, GLY, LL	105	67.8	10.3	32.2	7.0	43	78	49	32	3,150	32,600
NuTech/ 3A-804 GT	Bt, GLY	104	61.4	10.3	26.6	5.6	42	78	50	34	3,150	32,400
Dekalb/ DKC54-49 VT3	Bt, CRW, GLY	104	66.3	9.2	27.2	6.3	45	77	51	31	3,070	28,100
NuTech/ 3U-306	Bt, CRW, GLY, Lf	106	65.9	9.4	27.7	6.4	48	76	52	25	2,930	27,700
Dyna-Gro/ V3593 VT3	Bt, CRW, GLY	95	57.1	9.3	21.8	6.2	45	77	50	32	2,880	26,900
Dyna-Gro/ V4592VTNS	CRW, GLY	105	62.2	9.0	23.9	6.4	47	76	51	29	2,950	26,600
Dairyland/ 8208	Bt, CRW, LL	108	67.4	8.7	26.8	6.3	45	77	49	29	3,030	26,500
Hyland Seeds/ HL CVR48 VT3	Bt, CRW, GLY	88	62.3	8.7	23.1	5.6	45	78	51	31	3,030	26,400
Dyna-Gro/ 55R10	Bt, CRW, GLY, LL	100	66.8	8.9	26.8	6.3	47	76	50	28	2,960	26,200
Pioneer Brand/ 37N16	Bt, CRW, GLY, LL	99	61.5	9.1	23.8	6.4	47	76	48	30	2,820	25,800
NuTech/ 3T-098 VT3	Bt, CRW, GLY	98	60.4	8.7	22.0	5.8	44	76	49	33	2,940	25,600
Dekalb/ DKC45-79 VT3	Bt, CRW, GLY	95	61.1	8.5	21.8	6.0	47	76	50	30	2,870	24,400
Wensman/ 7107 VT3	Bt, CRW, GLY	90	58.7	7.8	18.8	6.4	40	80	51	37	3,140	24,300
Wensman/ 7273 VT3	Bt, CRW, GLY	98	62.1	8.1	21.3	6.2	46	75	48	31	2,870	23,200
Hyland Seeds/ HL SR35	GLY, Lf	88	58.5	8.8	21.1	6.5	53	72	50	23	2,550	22,300
Dekalb/ DKC50-44 VT3	Bt, CRW, GLY	100	62.3	6.9	18.4	5.7	49	75	51	28	2,860	19,800
Mean	—	—	62.6	8.9	23.9	6.2	46	76	50	30	2,950	26,200
LSD(0.10)	—	—	2.0	ns	4.9	0.6	3	2	2	4	180	5,800
CV	—	—	2.3	14.4	14.9	7.2	5.9	2.3	2.5	9.4	4.5	16.0

[1] CB, CRW, GLY, LL traits contain genes for European corn borer tolerance, corn rootworm tolerance, and glyphosate and Liberty Link R (glufosinate-ammonium) herbicide resistance, respectively. The LF trait denotes leafy silage.

[2] DM yield is whole-plant corn yield at 100% dry matter; Silage yield is whole-plant corn yield at harvest moisture.

[3] Quality concentration expressed as a % of DM, except NDFD which is expressed as a % of NDF. Refer to Results Provided text for additional information.

[4] Milk production was estimated using spreadsheet MILK2006 developed at the University of Wisconsin. Refer to Results Provided text for additional information.

Minnesota Agricultural Experiment Station
UNIVERSITY OF MINNESOTA

Varietal Trials Results

January 2010

Oat

Deon Stuthman and Roger Caspers

Proper selection of oat varieties requires consideration of the anticipated growing conditions, the pests that might be encountered in a specific production situation, the purpose for growing the crop and its eventual usage. Specific growing situations will dictate the priority and emphasis given to each trait included in the tables. While crown rust usually is the most important disease, in 2008 there was little crown rust in the state except in the southeast quarter because the weather elsewhere in mid-2008 was not favorable for rust infection in spite of ample inoculum and many susceptible varieties in production.

A detailed interpretation of our crown rust data follows. Because of several changes in rust races in recent years, many of the varieties currently grown are now susceptible to crown rust. In the disease data table, the crown rust rating is a combination of the quantity of pustules and their relative size. The scores range from susceptible to moderately susceptible. Three varieties, Souris, Stallion and Beach, are less likely to suffer severe damage than the other seven varieties in the table.

Treated seed should be used for smut-susceptible varieties, and those with BYDV (red leaf) susceptibility (score of 6.0 or higher) should be chosen carefully.

Earlier varieties may perform relatively better in more southerly parts of the state; later varieties usually have an advantage in the north. Taller varieties generally tend to produce more forage and/or straw. Lodging can be site-specific; varieties with lodging scores above 2.0 should be chosen cautiously, especially if your soil is highly fertile. Groat percent is an important consideration for grain production, perhaps equal to grain yield, whether the crop is intended for food or feed. This year we have again added the calculated trait, groat yield, a combination of bushels per acre and groat percent.

Descriptions of oat varieties covered by the U.S. Plant Variety Protection Act include a PVP designation. When PVP is followed by the notation (94), seed of that variety may not be sold by a grower, not even to a relative or neighbor, without the expressed permission of the variety's developer/owner. If the PVP designation is followed by (pending), consider the variety as having PVP (94) protection.

General-Purpose Varieties

Many of these varieties have been tested three years or more; they usually are not grown for a specific special purpose.

Baker — Medium maturity, average yield, medium height, fair lodging resistance, average test weight, fair groat percentage. Ivory-white seed. Susceptible to crown rust, resistant to smut and tolerant to red leaf. Selected at Iowa AES. Released in 2006.

Beach — Late maturity, high yield, taller, medium lodging resistance, above average test weight and groat percentage. Some resistance to crown rust, moderately resistant to smut, susceptible to red leaf. Ivory-white seed. Selected at N.D. AES. Released in 2006. **PVP (94)**

Buckskin — Medium maturity, high yield, average height, good lodging resistance, good test weight, average groat percent. Susceptible to crown rust and smut, tolerant to red leaf. White seed. Released at Ill. AES in 2007. **PVP (94)**

Esker — Early-medium maturity, average yield and height, fair lodging resistance, below average test weight, better groat percentage. Yellow seed. Susceptible to crown rust, resistant to smut, some tolerance to red leaf. Selected at Wis. AES. Released in 2003. Foundation seed available to certified seed producers only under a license/fee collection agreement. **PVP (94)**

Oat traits, 2007-2009.

Variety	Days After Planting To Heading	Height, Inches	Lodging, 1 = Erect 5 = Flat	Test Weight, Lb/Bu	Groat %	Groat Yield, Bu/Acre
Beach	64	37	1.7	44.2	73.6	82.7
Buckskin	61	32	1.8	43.4	72.5	79.4
Esker	59	31	2.0	41.6	73.2	79.5
Excel	59	31	2.2	40.8	69.2	76.3
Kame	58	30	2.2	39.0	72.2	70.7
Morton	64	36	1.9	41.3	71.5	71.5
Rockford[1]	64	36	1.5	44.5	74.3	91.4
Souris	63	32	1.5	43.3	74.6	82.8
Spurs[2]	61	28	1.4	43.6	71.5	78.9
Stallion	63	36	2.4	42.8	72.3	81.5
Winona	58	31	1.9	42.0	73.3	65.3
Average	62	33	1.8	42.4	72.4	78.8

[1] 2008-09 data only, adjusted for 3 years. [2] 2007 and 2009 data only, adjusted for 3 years.

Oat yield, percent of mean, by location, 2007-2009.

Variety	Rosemount	Waseca	Lamberton	Morris[1]	Crookston	Average of 5 locations
Beach	95	101	104	117	102	103
Buckskin	98	89	103	109	104	101
Esker	102	99	107	90	98	100
Excel	103	95	105	102	100	101
Kame	90	83	97	87	90	90
Morton	81	89	93	104	94	92
Rockford[2]	109	122	104	NA	113	113
Souris	104	105	101	90	107	102
Spurs[3]	100	86	104	95	100	97
Stallion	107	101	104	111	98	104
Winona	89	77	88	78	77	82
Location Mean (bu/acre)	98	95	116	114	123	109
LSD 0.05 (% of mean)	6.5	6.7	7.5	8.1	5.8	3.3

[1] 2007and 2009 data only.
[2] 2008-09 data only, adjusted for 3 years.
[3] 2007 and 2009 data only, adjusted for 3 years.

Excel – Early-medium maturity, high yield, shorter, average lodging resistance, below average test weight and groat percentage. Yellow seed. Susceptible to crown rust and smut, very good tolerance to red leaf. Selected at Purdue AES. Released in 2007. Foundation seed available to certified seed producers only under a license/fee collection agreement. **PVP (94)**

HiFi – Late maturity, high yield, tall, good lodging resistance, high test weight, medium groat percentage. White seed. Resistant to crown rust, moderately susceptible to smut, some tolerance to red leaf. Selected at N.D. AES. Released in 2001. **PVP (94)**

Kame – Early maturity, below average yield, short, good lodging resistance, poor test weight, average groat percentage. Yellow seed. Susceptible to crown rust, moderately resistant to smut, susceptible to red leaf. Selected at Wis. AES. Released in 2004. Foundation seed available to certified seed producers only under a license/fee collection agreement. **PVP (94)**

Moraine – Medium maturity and yield, short, fair lodging resistance, good test weight, high groat percentage. Yellow seed. Susceptible to crown rust, resistant to smut, some tolerance to red leaf. Selected at Wis. AES. Released in 2001. Foundation seed available to certified seed producers only under a license/fee collection agreement. **PVP (94)**

Morton – Late maturity, below average yield, tall, average lodging resistance, below average test weight, fair groat percentage. Ivory seed. Susceptible to crown rust, resistant to smut, susceptible to red leaf. Selected at N.D. AES. Released in 2001. **PVP (94)**

Reeves – Early maturity, fair yield, medium height, poor lodging resistance, high test weight and groat percentage. Ivory seed. Susceptible to crown rust, moderately susceptible to smut, susceptible to red leaf. Selected at S.D. AES. Released in 2002.

Richard – Early-medium maturity, medium yield, tall, good lodging resistance, high test weight, medium groat percentage. Yellow seed. Susceptible to crown rust, resistant to smut, some tolerance to red leaf. Selected at Minn. AES. Released in 2000. **PVP (94)**

Riser – Early maturity, lower yield, short, fair lodging resistance, high test weight and groat percentage. Yellow seed. Some resistance to crown rust and smut, susceptible to red leaf. Selected at S.D. AES. Released in 1998.

Disease data in a single year, 2009.

Variety	Crown Rust (Buckthorn Nursery) Amount[1]	Crown Rust (Buckthorn Nursery) Reaction Type[2]	Smut Score[3]	BYDV Score[4]
Beach	50	S	MR	5
Buckskin	45	S	S	4
Esker	45	S	R	4
Excel	60	S	MS	3
Kame	45	S	R	6
Morton	40	S	R	6
Rockford	25	MS	MR	3
Souris	30	S	R	3
Spurs	50	S	MR	4
Stallion	30	MS	MS	5
Winona	50	S	R	4

[1] Relative proportion of rust spores that will achieve a successful infection.
[2] R = resistant, MR = moderately resistant, MS = moderately susceptible and S = susceptible.
[3] Artificially innoculated, R = resistant, MR = moderately resistant, MS = moderately susceptible and S = susceptible.
[4] Barley Yellow Dwarf Virus score from Urbana, Illinois, with 1 = no symptoms and 9 = dead.

Oat yield, (percent of mean) off-station locations, 2009 only.

Variety	Stephen	Winona
Beach	97	NA
Buckskin	107	NA
Esker	122	125
Excel	96	114
Kame	96	87
Morton	91	NA
Rockford	113	NA
Souris	112	NA
Spurs	105	135
Stallion	106	72
Winona	103	100
Location mean (bu/acre)	139	91
LSD 0.05 (%)	13.1	26.4

Sesqui – Late maturity, lower yield, average height, fair lodging resistance, fair test weight, poor groat percentage. Yellow seed. Susceptible to crown rust, resistant to smut, good tolerance to red leaf. Selected at Minn. AES. Released in 2001.

Souris — Medium-late maturity, medium yield, shorter, very good lodging resistance, good test weight, very good groat percentage. Ivory-white seed. Some resistance to crown rust. Resistant to smut and susceptible to red leaf. Selected at North Dakota AES. Released in 2006. **PVP (94)**

Spurs — Early-medium maturity, good yield, short with good lodging resistance. Good test weight, average groat percentage. Ivory-white seed. Susceptible to crown rust, smut, and red leaf. Released by Ill. AES in 2005. **PVP (94)**

Stallion — Late maturity, high yield, tall with poor lodging resistance. Good test weight, average groat percentage. White seed. Some resistance to crown rust, susceptible to smut and red leaf. Released by S.D. AES in 2006. **PVP (94)**

Wabasha — Medium maturity and height; lower yield, fair lodging resistance and test weight, high groat percentage. White seed. Susceptible to crown rust, resistant to smut and tolerant to red leaf. Selected at Minn. AES. Released in 2001.

Winona — Early, low yield, short, average lodging resistance, average test weight, good groat percentage. Yellow seed. Susceptible to crown rust, resistant to smut and red leaf. Selected at Minn. AES. Released in 2005.

Special-Purpose Variety

This variety has also been tested three years or more, and has special attributes that differentiate it from general-purpose varieties or is intended for a specific end use.

Buff — Hulless. Medium maturity, good yield for hulless variety. Medium height, good lodging resistance, very high test weight. Susceptible to crown rust, resistant to smut, susceptible to red leaf. Selected at S.D. AES. Released in 2002.

Test Plot Research

Test plot establishment and management were supervised by Tom Hoverstad, George Nelson, Steve Quiring and John Weirsma.

Oat
Planting Rate and Date

Bushel Weight, Pounds	32
Seeds/Pound	16,200
Planting Rate, Pounds/Acre	80
Planting Rate, Seeds/Sq. Ft.	28
Planting Date	Early Spring

Minnesota Agricultural Experiment Station
University of Minnesota

Varietal Trials Results

January 2010

Wheat, Hard Red Spring

Jim Anderson, Jochum Wiersma, Gary Linkert, Susan Reynolds and Catherine Springer

Spring wheat varieties were compared in replicated trial plots at Waseca, Lamberton, Morris, Crookston, Stephen and St. Paul and on-farm sites near Fergus Falls, Oklee and Perley. The Roseau location was not seeded due to excessively wet conditions. These plots are handled so that the factors affecting yield and other characteristics are as nearly the same for all varieties at each location as possible.

These hard red spring wheat trials are not designed for crop (species) comparisons, because the various crops are grown on different fields or with different management. The data should only be used to compare varieties within a table. Tested hard red spring wheat varieties are listed in the order of their flowering date in the tables.

Variety Selection Criteria

While grain yield is an important economic trait, return per acre also is affected by grain quality. Because Fusarium Head Blight (FHB), or scab, can reduce grain quality and yield dramatically, it is an important consideration.

The foliar disease rating, which represents the total complex of leaf diseases other than leaf and stripe rust, includes the Septoria complex, tan spot, powdery mildew and bacterial leaf stripe. Although varieties may differ for their response to each of those diseases, the rating does not differentiate among them. Consequently, the rating should be used as a general indication and only for varietal selection in areas where these diseases have been a problem or if the previous crop was wheat or barley. Control of leaf diseases with fungicides may be warranted, even for varieties with an above-average rating.

Table 1. Origin and agronomic characteristics of hard red spring wheat varieties in Minnesota in single-year (2009) and multiple-year comparisons (2007-2009).

Variety	Origin[1]	Days to Heading[2]	Height inches[2]	Straw strength[3]
Ada	2006 MN	53.5	30.5	4
Albany	2009 Trigen	55.8	30.0	5
Barlow	2009 NDSU	51.7	32.7	6
Bigg Red	2004 WestBred	54.7	33.9	6
Blade	2007 WestBred	53.8	31.0	4
Breaker	2008 WestBred	53.1	31.2	3
Brennan	2009 AgriPro	55.6	30.4	4
Brick	2009 NDSU	48.1	32.9	5
Briggs	2002 SDSU	49.7	32.3	7
Brogan	2009 Westbred	53.1	29.4	3
Cromwell	2007 Thunder Seed	54.3	31.0	5
Faller	2007 NDSU	54.1	31.8	5
Freyr	2004 AgriPro	51.9	33.5	6
Glenn	2005 NDSU	50.6	33.4	4
Granger	2004 SDSU	51.5	34.8	7
Hat Trick	2006 Trigen	53.1	30.5	5
Howard	2006 NDSU	52.1	33.0	7
Jenna	2009 AgriPro	55.2	30.6	4
Kelby	2006 AgriPro	50.5	27.8	4
Knudson	2001 AgriPro	52.5	30.4	5
Kuntz	2007 AgriPro	52.7	29.0	4
Marshall	1982 MN	55.2	29.2	4
Oklee	2003 MN	50.3	30.8	6
RB07	2007 MN	50.4	29.8	5
Sabin	2009 MN	53.4	30.0	6
Samson	2007 WestBred	52.6	28.3	2
Steele-ND	2004 NDSU	53.1	32.5	7
Tom	2008 MN	51.7	32.2	6
Traverse	2006 SDSU	51.1	33.6	6
Vantage	2007 WestBred	56.5	30.0	2
Mean		52.7	31.2	

[1] Abbreviations: MN = Minnesota Agricultural Experiment Station, NDSU = North Dakota State University Research Foundation, SDSU = South Dakota Agricultural Experiment Station, Trigen = Trigen Seed Services LLC.

[2] 2009 data.

[3] 1-9 scale in which 1 is the strongest straw and 9 is the weakest. Based on 2005-2009 data. The rating of newer entries may change by as much as one rating point as more data are collected.

Disease ratings are now on a 1-9 scale where 1 = most resistant and 9 = most susceptible. Rating differences of 2 or more should be considered significant. Bacterial leaf stripe assessments for the most consistently resistant and susceptible varieties are footnoted in the Other Leaf Diseases column of Table 3. This rating is based on four locations from 2005 to 2009 where bacterial leaf stripe was observed. Additional data are needed before a complete rating of all varieties can be provided.

Blade, Cromwell, Faller, Howard and Knudson are consistently more resistant to bacterial leaf stripe while Hat Trick, Kelby, and Samson have consistently been more susceptible. At this point there are no effective control options for bacterial leaf stripe other than avoiding the use of infected seed. However, the extent to which seed-borne inoculum contributes to disease problems the next season is unknown.

Based on acres planted, leading varieties in Minnesota are Faller and RB07. New releases for 2009 are Albany (Trigen), Barlow (NDSU), Brennan and Jenna (AgriPro), Brogan (Westbred), Brick (SDSU) and Sabin (MN).

Leaf rust caused substantial damage on susceptible varieties in 2007. Varieties with ratings of 5 or higher should be closely monitored during the season for rust development. Varieties with ratings of 4 or better should not experience economic levels of damage in most years.

Stripe rust was a serious problem on susceptible varieties in some locations in 2004. This disease is not as widespread and does not occur as regularly as leaf rust, but can be very damaging when temperatures remain unseasonably cool into early July. Most varieties are resistant or moderately resistant.

Stem rust ratings are included in the disease tables because there are differences in variety reaction. The levels of this disease have been very low in production fields in recent years, even on susceptible varieties.

Due to the increased use of fungicides on wheat in Minnesota, we initiated an additional variety trial in 2004 in which fungicides are applied at the time of herbicide application (Feekes 5), flag leaf emergence (Feekes 9), and at the onset of flowering (Feekes 10.51). The practice of three fungicide applications during the growing season is not recommended.

Table 2. Grain quality of hard red spring wheat varieties in Minnesota in single-year (2009) and multiple-year comparisons (2007-2009).

	Test Weight (Lb/Bu)		Protein (%)[1]		Baking	Pre-Harvest
Variety	2009	2-Year	2009	2-Year	Quality[2]	Sprouting[3]
Ada	62.3	62.1	14.5	14.3	Medium	2
Albany	61.4	60.5	13.7	13.7	Low-Medium	4
BarLow	62.3	62.1	15.4	15.1	—	1
Bigg Red	62.6	62.9	14.1	14.0	Medium-Low	4
Blade	62.6	62.5	15.3	14.9	Medium-High	5
Breaker	62.8	62.7	15.2	14.8	—	—
Brennan	60.6	60.3	15.3	14.6	—	—
Brick	62.6	62.4	15.1	14.9	Medium	2
Briggs	61.9	61.5	15.1	14.8	Medium	2
Brogan	61.6	—	14.5	—	—	—
Cromwell	62.2	62.1	15.2	14.9	Medium-High	3
Faller	61.4	61.1	14.4	14.4	Medium	2
Freyr	61.3	60.6	15.1	14.7	Medium	2
Glenn	64.0	63.8	15.7	15.5	High	1
Granger	61.0	61.0	14.9	14.9	Medium	4
Hat Trick	61.8	61.9	14.9	14.5	Medium-Low	4
Howard	62.9	61.9	15.2	14.9	Medium-High	1
Jenna	60.4	61.0	14.6	14.5	—	—
Kelby	60.9	61.2	15.5	15.0	Medium	1
Knudson	61.3	61.2	14.4	14.0	Medium-High	3
Kuntz	60.5	60.5	14.7	14.3	Medium	2
Marshall	60.1	59.2	14.3	14.0	Low	2
Oklee	62.1	62.1	15.4	15.2	Low-Medium	3
RB07	61.3	61.1	15.2	14.8	Medium-High	2
Sabin	60.9	60.5	14.8	14.6	Medium-High	4
Samson	60.6	60.4	14.0	13.9	Medium-High	4
Steele-ND	62.2	61.9	15.4	15.1	High	2
Tom	61.5	61.4	15.0	14.6	Medium	1
Traverse	59.1	59.0	14.1	14.0	Low	4
Vantage	62.8	62.7	15.7	15.5	Medium	2
Mean	61.6	61.4	14.9	14.6		

[1] 12% moisture basis.

[2] 2004-2008 crop years.

[3] 1-9 scale in which 1 is best and 9 is worst. Values of 1-3 should be considered as resistant.

Table 3. Disease reactions[1] of hard red spring wheat varieties in Minnesota in multiple-year comparisons (2007-2009).

Variety	Leaf Rust	Stem Rust[2]	Other Leaf Diseases[3]	Scab
Ada	5	2	5[4]	6
Albany	3	3	5	4
Barlow	1	1	—	4
Bigg Red	8	2	7	3
Blade	2	2	3[6]	4
Breaker	3	2	3	—
Brennan	2	2	—	—
Brick	2	2	7	3
Briggs	1	2	5	5
Brogan	—	—	—	—
Cromwell	4	1	4[6]	4
Faller	1	1	3[6]	4
Freyr	4	4	4	4
Glenn	1	1	4	3
Granger	3	1	4	5
Hat Trick	5	4	5[4,5]	4
Howard	1	1	4[6]	6
Jenna	3	2	—	—
Kelby	2	1	4[5]	5
Knudson	2	3	3[6]	6
Kuntz	3	1	4	6
Marshall	8	1	7	7
Oklee	4	1	5	5
RB07	1	1	5	5
Sabin	3	1	6	4
Samson	5	1	6[5]	7
Steele-ND	1	1	4	6
Tom	4	1	5	4
Traverse	5	2	5	5
Vantage	5	3	6	5

[1] 1-9 scale: 1 = most resistant, 9 = most susceptible.

[2] Stem rust levels have been very low in production fields in recent years. Even on susceptible varieties.

[3] Includes tan spot, septoria, bacterial leaf stripe and powdery mildew.

[4] These varieties are more susceptible to powdery mildew.

[5] This variety was more susceptible to bacterial leaf stripe based on three environments with this disease from 2007 and 2009.

[6] These varieties were more resistanct to bacterial leaf stripe based on three environments with this disease from 2007 and 2009.

This fungicide regime was implemented to measure the performance of varieties when fungal diseases were controlled to the maximum extent possible. A grower's decisions regarding fungicide applications should be based on the available decision support systems, and only if and when disease levels are forecasted to reach economic damaging levels.

The additional performance evaluations were carried out adjacent to the conventional (no fungicides applied) trials, so results can be compared directly. The trials were conducted in Lamberton, Crookston, and Morris in 2009. In 2009, the fungicide regime as applied in these trials increased grain yield on average by more than 5 bu/acre, compared to about 9 bu/acre in 2007 and 4 bu/acre in 2008. The 3-year comparisons showed an increase in grain yield of about 6 bu/acre.

Rather than the average increases in grain yield, the responses of individual varieties provide the most useful information; varieties rated susceptible to leaf rust and other fungal leaf diseases benefited most from fungicide applications.

Test Plot Research

Test plot establishment and management were supervised by Jim Cameron, Derek Crompton, Matt Bickell, Steve Quiring and Donn Vellekson.

Hard red spring wheat planting rate and date.

Calculating and seeding the appropriate amount of seed is an important first step towards maximizing yield. The seeding rate is a function of the number of kernels per pound of seed, the percent germination of the lot, the expected stand loss as a function of the quality of the seedbed, and the desired stand. In Minnesota, an average optimum stand for hard red spring wheat when planted early is between 28 to 30 plants per square foot or approximately 1.25 million plants per acre. This number should increase by 1 to 2 plants per square foot for every week planting is delayed past the early, optimum, seeding date. Expected stand loss even under good seedbed conditions is between 10% to 20% and will increase with a poor seedbed or improper seed placement due to poor depth control.

The general formula for calculating a seeding rate is:

$$\text{Seeding Rate (Pounds/Acre)} = \frac{\text{Desired Stand (Plants/Acre)} \div (1 - \text{Expected Stand Loss})}{\text{(Seeds/Pound)} \times \text{Percentage Germination}}$$

Calculate the seeding rate for every single seed lot and calibrate the drill accordingly.

Example: Early variety.

Desired Stand, (Plants/Acre)	Expected Stand Loss	Seeds per Pound	Percentage Germination	Seeding Rate, (Lb/Acre)
1.25 million	0.20	14,000	0.95	117

Table 4. Relative grain yield of hard red spring wheat varieties in northern Minnesota locations in single-year (2009) and multiple-year comparisons (2006-2009).

	Crookston			Roseau	Stephen			On-Farm		
Variety	2009	2-Year	3-Year	2-Year [1]	2009	2-Year	3-Year	Average [2]	2-Year	3-Year
Ada	97	98	97	98	98	99	98	96	98	98
Albany	114	113	119	96	106	97	106	112	112	—
Barlow	105	99	—	—	110	107	—	96	100	—
Bigg Red	92	92	92	89	90	89	90	99	97	93
Blade	101	101	101	104	96	94	98	102	100	101
Breaker	104	103	—	—	99	103	—	97	99	—
Brennan	98	99	—	—	98	101	—	96	99	—
Brick	83	92	98	98	96	101	100	100	103	—
Briggs	99	98	99	112	104	95	97	94	96	98
Brogan	98	—	—	—	97	—	—	101	—	—
Cromwell	103	102	102	110	98	97	97	98	98	100
Faller	124	119	123	125	119	111	116	115	110	112
Freyr	99	102	104	99	97	96	98	101	99	101
Glenn	88	91	94	100	94	100	97	89	93	95
Granger	90	93	93	99	94	89	90	103	103	102
Hat Trick	87	94	93	96	111	105	109	103	101	102
Howard	111	105	103	105	104	99	103	105	101	99
Jenna	108	104	—	—	97	102	—	101	106	—
Kelby	86	94	96	112	93	100	99	90	93	93
Knudson	109	105	106	103	103	102	105	105	104	106
Kuntz	94	100	104	100	98	102	101	95	99	102
Marshall	96	96	88	81	87	86	85	91	85	79
Oklee	98	96	96	104	98	100	98	90	96	96
RB07	102	104	106	90	100	106	106	107	104	105
Sabin	98	101	101	99	99	97	98	105	104	104
Samson	120	115	114	111	114	111	113	100	102	105
Steele-ND	100	98	99	99	97	97	96	100	99	102
Tom	93	96	99	105	107	113	107	96	100	100
Traverse	104	104	106	115	114	116	115	115	108	111
Vantage	106	98	99	104	97	94	98	99	94	94
Mean (Bu/Acre)	85.8	92.3	97.9	*59.3*	79.0	79.1	76.3	88.5	90.1	86.4
LSD (0.05)	11.6	10.7	8.8	17.9	10.3	12.4	10.7	7.0	6.5	6.8
No. Environments	1	2	3	2	1	2	3			

[1] The Roseau site was not planted in 2009 due to excessive wetness. 2-year data are 2007-2008 average.
[2] 2-year data are 2007-2008.

Table 5. Relative grain yield of hard red spring wheat varieties in southern Minnesota locations in single year (2009) and multiple-year comparisons (2007-2009).

	Lamberton			Morris [1]		St. Paul			Waseca		
Variety	2009	2-Year	3-Year	2009	2-Year	2009	2-Year	3-Year	2009	2-Year	3-Year
Ada	89	87	93	110	107	109	91	87	93	98	94
Albany	136	109	120	112	111	108	107	103	133	128	129
Barlow	95	97	—	102	—	95	100	—	99	101	—
Bigg Red	97	104	100	103	101	111	105	104	111	101	100
Blade	97	102	104	95	99	98	99	101	99	97	97
Breaker	111	105	—	101	—	102	102	—	106	105	—
Brennan	112	113	—	108	—	113	110	—	113	111	—
Brick	90	101	101	89	98	93	99	101	89	90	85
Briggs	92	96	105	95	101	94	102	105	94	89	83
Brogan	105	—	—	116	—	106	—	—	100	—	—
Cromwell	98	93	91	100	99	87	93	95	98	94	90
Faller	123	114	120	111	116	96	92	97	120	106	106
Freyr	109	104	103	97	100	100	102	105	98	96	91
Glenn	99	95	98	75	80	105	103	102	86	87	87
Granger	93	111	114	117	115	100	99	99	112	94	96
Hat Trick	77	86	95	94	98	69	73	75	108	101	110
Howard	109	113	112	107	102	122	117	117	93	104	109
Jenna	107	112	—	109	—	101	106	—	123	115	—
Kelby	87	93	96	86	90	105	113	120	85	91	87
Knudson	101	112	117	107	110	92	92	90	98	103	109

[1] The Morris 2008 trial was abandoned due to herbicide drift damage. The 2-year data are from 2007 and 2009.

Table 5. (coninued) Relative grain yield of hard red spring wheat varieties in southern Minnesota locations in single year (2009) and multiple-year comparisons (2007-2009).

	Lamberton			Morris[1]		St. Paul			Waseca		
Variety	2009	2-Year	3-Year	2009	2-Year	2009	2-Year	3-Year	2009	2-Year	3-Year
Kuntz	96	91	95	108	107	89	97	98	103	99	96
Marshall	101	80	75	96	83	89	81	78	73	69	59
Oklee	108	98	95	100	97	101	106	108	103	101	102
RB07	100	100	102	98	93	96	103	105	99	105	103
Sabin	98	109	110	98	106	114	110	110	98	108	120
Samson	101	99	102	107	106	113	110	108	93	101	106
Steele-ND	97	99	104	97	102	110	107	109	87	102	110
Tom	102	101	99	81	89	98	101	104	102	94	86
Traverse	115	122	120	111	112	103	100	100	104	110	120
Vantage	112	103	101	109	103	95	97	91	90	95	100
Mean (Bu/Acre)	65.5	52.7	50.8	49.6	61.8	58.1	63.5	62.4	54.0	57.1	55.6
LSD (0.05)	14.1	15.8	18.1	19.1	14.3	18.2	13.4	12.3	20.1	18.9	18.6
No. Environments	1	2	3	1	2	1	2	3	1	2	3

[1] The Morris 2008 trial was abandoned due to herbicide drift damage. The 2-year data are from 2007 and 2009.

Table 6. Relative grain yield of hard red spring wheat varieties in Minnesota in single-year (2009) and multiple-year comparisons (2007-2009).

	State			North			South		
Variety	2009	2-Year	3-Year	2009	2-Year	3-Year	2009	2-Year	3-Year
Ada	99	96	96	98	97	98	100	95	94
Albany	118	109	113	110	103	108	122	114	116
Barlow	101	100	—	107	102	—	98	100	—
Bigg Red	101	99	97	91	93	91	105	103	101
Blade	98	99	100	99	98	101	97	99	100
Breaker	104	104	—	102	103	—	105	104	—
Brennan	107	107	—	98	101	—	111	111	—
Brick	90	96	97	90	96	99	90	96	96
Briggs	96	96	100	101	96	102	94	95	98
Brogan	104	—	—	98	—	—	107	—	—
Cromwell	97	97	97	100	100	102	96	94	93
Faller	116	110	114	122	117	121	113	105	109
Freyr	100	99	100	98	98	101	101	100	100
Glenn	91	94	95	91	97	97	91	92	93
Granger	101	99	100	92	91	93	106	104	105
Hat Trick	91	93	97	99	100	100	87	88	94
Howard	107	107	108	107	102	103	107	111	111
Jenna	108	108	—	102	104	—	110	111	—
Kelby	90	98	100	89	98	101	91	97	99
Knudson	102	103	106	106	102	105	99	103	106
Kuntz	98	99	100	96	102	102	99	97	98
Marshall	90	84	78	92	91	85	90	80	73
Oklee	101	101	100	98	99	99	103	102	101
RB07	99	102	102	101	103	102	98	102	102
Sabin	101	104	107	99	98	99	102	107	112
Samson	108	107	108	117	112	113	103	104	105
Steele-ND	98	100	103	99	96	98	98	102	106
Tom	97	99	99	100	104	104	96	96	95
Traverse	108	110	112	109	110	112	108	111	113
Vantage	102	100	99	102	100	100	101	100	99
Mean (Bu/Acre)	65.0	67.7	65.5	82.4	82.1	76.4	55.9	56.0	56.9
LSD (0.05)	9.8	6.5	5.7	10.6	7.6	6.7	11.5	10.0	8.6
No. Environments	6	12	19	2	5	8	4	7	11

Table 7. Grain yield (bushels per acre) of hard red spring wheat varieties grown under conventional and intensive management.

	North						South						State					
	2009		2-year		3-year		2009		2-year		3-year		2009		2-year		3-year	
Variety	Conv	Int	Conv	Int	Conv	Int	Conv	Int	Conv	Int	Conv	Int	Conv	Int	Conv	Int	Conv	Int
Ada	83.5	89.2	81.0	85.0	73.2	81.6	55.1	55.2	47.9	52.2	53.1	56.3	64.6	66.5	64.5	68.6	63.1	68.9
Albany	97.6	105.7	90.0	94.8	—	—	69.5	76.1	57.1	67.0	—	—	78.8	86.0	73.6	80.9	—	—
Barlow	90.3	93.4	81.9	84.7	—	—	55.0	63.7	49.9	56.8	—	—	66.9	73.6	65.9	70.8	—	—
Bigg Red	78.3	84.4	79.8	81.9	69.0	76.6	55.6	64.4	51.9	59.9	53.3	63.8	63.4	71.0	65.8	70.9	61.1	70.2
Blade	87.1	88.3	84.6	85.3	76.7	77.5	54.1	59.1	50.3	53.8	54.3	58.7	65.1	68.9	67.5	69.6	65.5	68.1
Breaker	89.6	91.2	86.3	87.9	—	—	59.3	59.3	53.0	54.6	—	—	69.4	69.9	69.6	71.3	—	—
Brennan	84.1	97.7	84.3	94.3	—	—	61.7	68.4	56.4	62.7	—	—	69.2	78.2	70.3	78.5	—	—
Brick	71.4	87.3	78.0	85.9	—	—	51.1	58.6	49.3	54.9	—	—	57.6	68.1	63.6	70.4	—	—
Briggs	84.8	88.5	81.3	84.8	76.9	81.7	52.3	59.6	48.2	54.9	55.0	59.4	63.1	69.3	64.8	69.8	65.9	70.5
Brogan	84.5	89.9	—	—	—	—	61.5	63.0	—	—	—	—	69.1	72.0	—	—	—	—
Cromwell	88.1	90.0	85.7	89.2	78.3	82.8	55.5	59.3	48.7	52.8	50.6	54.4	66.3	69.6	67.2	71.0	64.5	68.6
Faller	106.3	108.3	100.3	102.8	92.6	95.0	66.4	73.6	58.2	64.6	63.7	68.2	79.7	85.2	79.2	83.7	78.2	81.6
Freyr	84.9	93.0	83.9	89.2	77.0	84.2	58.3	65.5	52.2	59.2	54.8	61.9	67.2	74.7	68.0	74.2	65.9	73.0
Glenn	75.5	77.2	78.9	82.6	72.2	76.6	50.0	55.6	45.6	50.3	48.7	53.6	58.5	62.8	62.3	66.5	60.4	65.1
Granger	77.5	73.3	77.5	78.9	71.3	74.2	57.8	68.1	55.8	63.1	60.0	66.2	64.4	69.9	66.7	71.0	65.6	70.2
Hat Trick	74.4	86.9	80.9	87.0	71.4	79.1	48.0	53.2	45.0	48.5	51.5	55.5	56.6	64.4	63.0	67.8	61.4	67.3
Howard	95.4	88.1	87.1	86.5	77.9	81.6	60.3	56.3	55.9	54.7	57.1	60.0	72.1	66.9	71.5	70.6	67.5	70.8
Jenna	92.3	100.1	87.6	90.7	—	—	60.5	67.5	55.9	62.6	—	—	71.1	78.4	71.7	76.6	—	—
Kelby	73.7	77.4	80.9	80.4	75.7	77.9	48.9	52.2	46.1	52.8	50.1	55.4	56.9	60.6	63.5	66.6	63.0	66.6
Knudson	93.3	99.6	85.7	87.3	78.6	82.4	58.0	63.1	55.1	59.9	60.1	65.3	69.8	75.3	70.4	73.6	69.4	73.9
Kuntz	83.1	87.6	85.9	87.5	78.0	82.7	56.6	65.7	49.2	58.8	53.8	59.4	65.5	73.0	67.5	73.2	65.9	71.1
Marshall	82.7	92.4	78.7	86.1	65.2	82.8	54.2	63.0	43.9	55.9	41.6	58.0	66.1	69.9	61.3	71.0	53.4	70.4
Oklee	84.1	81.2	82.1	83.6	74.0	79.1	57.6	62.5	50.3	56.7	51.2	58.7	66.4	68.7	66.2	70.1	62.6	68.9
RB07	87.3	93.1	85.0	89.4	76.2	79.9	55.8	61.7	50.5	57.2	52.2	58.3	66.3	72.2	67.8	73.3	64.2	69.1
Sabin	84.1	96.4	83.2	87.3	—	—	55.2	64.8	52.8	58.0	—	—	63.5	71.1	68.0	72.6	—	—
Samson	102.8	99.7	95.1	98.7	85.1	91.6	58.4	62.3	51.7	59.6	55.6	63.6	64.8	75.5	73.5	79.2	70.4	77.6
Steele-ND	85.7	88.3	80.5	85.2	74.2	79.4	54.4	56.9	49.7	53.1	55.0	57.1	64.9	67.4	65.1	69.2	64.6	68.2
Tom	80.1	80.6	81.5	84.9	—	—	52.3	57.0	48.4	52.6	—	—	61.6	64.8	65.0	68.7	—	—
Traverse	89.5	98.6	88.2	88.1	81.6	83.5	63.4	71.2	59.6	67.0	62.2	71.5	72.1	80.3	73.9	77.6	71.9	77.5
Vantage	91.0	100.8	85.7	93.1	75.9	83.3	62.1	61.6	53.9	57.6	54.8	61.4	71.7	74.6	69.8	75.4	65.3	72.3
Mean (Bu/Acre)	85.9	90.7	84.2	87.7	76.2	81.6	56.0	61.5	50.3	55.9	54.2	60.3	66.0	71.2	67.8	72.5	65.2	71.0
LSD (0.05)	19.5	20.0	16.1	17.9	12.1	13.2	20.0	16.0	17.0	15.0	11.4	11.7	15.5	15.2	11.5	11.8	8.5	9.3
No. of Environments	1	1	3	3	5	5	2	2	3	3	5	5	3	3	6	6	10	10

Minnesota Agricultural Experiment Station
University of Minnesota

Varietal Trials Results

January 2010

Wheat, Hard Red Winter

Jim Anderson, Jochum Wiersma, Gary Linkert, Susan Reynolds and Catherine Springer

Winter wheat varieties were compared in trial plots at Lamberton and St. Paul; plots at Crookston and Roseau were not harvested due to adverse growing conditions. Wheat varieties were grown in replicated plots at each location. They were handled so that factors affecting yield and other characteristics are as nearly the same for all varieties at each location as is possible. These winter wheat trials are not designed for crop (species) comparisons, because the various crops are grown on different fields or with different management. The data should be used only to compare varieties within a table.

Variety Selection Criteria

The success of a winter wheat variety depends largely on its ability to survive Minnesota winters. Research on the Canadian plains has shown that planting winter wheat in standing canola stubble using no-till methods can decrease winterkill considerably. Trapped snow provides additional protection that increases the odds that the young seedlings will survive. While all winter wheat varieties should be considered susceptible to very susceptible to FHB, they head earlier than spring wheat varieties and have a better chance of escaping

Table 1. Growth characteristics of winter wheat varieties.

Variety	Origin[1]	PVP Status[2]	Heading, Days from Jan. 1[3]	Height, Inches[3]	Winter-Hardiness[4]	Lodging Rating	Test Weight, Lb /Bu		Protein % at 12% Moisture		Rust Resistance[5]	
							2009	2-Year	2009	2-Year	Leaf	Stem
Alice[6]	2006 SDSU	PVP (94)	152	26	M	M Strg	60.9	60.3	13.4	12.5	S	—
Arapahoe	1988 NE	PVP (94)	153	33	M	M Strg	60.4	59.9	13.3	12.5	MR	MR
Art	2008 AgriPro	PVP (94)	151	28	—	—	60.8	30.4	14.2	—	—	—
Boomer	2009 WPB	PVP (pending)	157	31	—	—	59.7	—	12.9	—	—	—
CDC Accipiter	2008 CAN	PVP (pending)	159	33	—	—	60.7	—	12.0	—	—	—
CDC Buteo	2001 CAN	PVP (94)	158	37	MH	Strong	63.4	62.8	12.8	12.0	MS	—
CDC Falcon	1998 CAN	PVP (94)	157	29	MH	Strong	59.0	59.3	13.0	12.1	MS	R
CDC Peregrine	2008 CAN	PVP (pending)	158	40	—	—	62.5	—	11.6	—	—	—
Darrell	2006 SDSU	PVP (94)	154	33	M	M Strg	60.8	60.1	13.2	12.5	MS	—
Hawken	2007 AgriPro	PVP (94)	152	26	P	Strong	60.1	60.0	13.8	13.1	R	—
Jerry	2001 NDSU	none	157	36	H	M Strg	60.6	60.2	13.6	12.8	MR	R
Lyman	2008 SDSU	PVP (94)	153	33	—	—	62.2	61.1	13.8	13.1	—	—
Millennium	1999 NE	PVP (94)	155	33	M	Strong	61.5	60.9	13.8	12.7	MR	R
Overland	2007 NE	PVP (94)	154	32	M	Strong	60.9	60.4	13.8	12.9	MR	—
Ransom	1998 NDSU	PVP (94)	156	36	MH	Med.	60.6	59.9	12.7	12.1	MR	MR
Roughrider	1975 NDSU	none	157	42	VH	Med.	62.2	61.1	13.4	12.5	S	R
Striker	2009 WPB	PVP (pending)	154	29	—	—	60.6	—	13.5	—	—	—
Wendy[6]	2004 SDSU	PVP (94)	151	28	M	M Strg	61.2	60.7	13.7	12.8	S	—
Mean			154.9	32.3			61.0	58.4	13.2	12.6		

[1] Abbreviations: CAN = Crop Development Centre, Saskatoon, Canada; NDSU = North Dakota State University; NE = Nebraska Agricultural Experiment Station; SDSU = South Dakota Agricultural Experiment Station; WPB = Western Plant Breeders.

[2] PVP = plant variety protection. When the letters are followed by (94), seed of that variety may not be sold by a grower to anyone without express permission of the variety's developer/owner. If the PVP designation is followed by (pending) consider that the variety has PVP (94) protection.

[3] 2009 data

[4] Winterhardiness rating is a relative ranking that includes data from Minnesota, North Dakota, Nebraska and South Dakota: VH = very high, H = high, MH = moderately high, M = moderate, P = poor. New varieties are not rated because only one site showed differential winter survival in 2009.

[5] R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible.

[6] White wheat

damage to FHB. Most winter wheat varieties also are susceptible to very susceptible to the leaf diseases other than the rusts. Use of fungicides to control these diseases and/or suppress FHB may be warranted.

All varieties listed are standard hard red winter wheats with the exception of Alice and Wendy, which have white grain. Several varieties were added to the trial in 2009. These include Art from AgriPro, CDC Accipiter and CDC Peregrine from Canada, Boomer and Striker from Westbred, and Lyman from SDSU, which was grown under experimental designation in 2008; results are reported here for the first time.

Test Plot Research

Test plot establishment and management were supervised by Jim Cameron, Derek Crompton, Matt Bickell, Steve Quiring and Donn Vellekson.

Hard Red Winter Wheat Planting Rate and Date

Bushel Weight (Pounds).....60

Seeds/Pound.....14,500

Pounds Rate/Acre.....75+

Seeds/Square Foot..... 25

Planting Date.....Aug. 20 – Sept. 20

Table 2. Yield (percent of the mean) of winter wheat varieties.

	Crookston[1]		Lamberton			Roseau[1]		St Paul			State		
Variety	2008	2-Year	2009	2-Year	3-Year	2008	2-Year	2009	2-Year	3-Year	2009	2-Year	3-Year
Alice	78	—	100	76	—	104	96	77	95	87	89	88	85
Arapahoe	104	104	102	105	109	102	106	105	101	102	103	102	105
Art	—	—	105	—	—	—	—	77	—	—	91	—	—
Boomer	—	—	101	—	—	—	—	107	—	—	104	—	—
CDC Accipiter	—	—	95	—	—	—	—	114	—	—	104	—	—
CDC Buteo	135	119	93	97	97	106	104	108	101	100	101	105	103
CDC Falcon	114	109	96	111	108	103	96	98	102	105	97	105	103
CDC Peregrine	—	—	112	—	—	—	—	116	—	—	114	—	—
Darrell	77	84	102	105	106	105	87	105	104	102	103	101	97
Hawken	82	—	105	95	—	112	—	73	93	—	89	93	—
Jerry	127	108	100	112	111	105	127	109	100	104	105	108	113
Lyman	81	—	95	101	—	96	—	115	111	—	105	101	—
Millennium	104	96	98	107	109	111	103	95	95	95	97	102	101
Overland	97	—	99	108	—	101	103	95	101	—	97	100	—
Ransom	123	111	103	102	107	85	95	106	103	104	105	103	105
Roughrider	98	98	83	92	93	77	84	96	86	91	90	89	91
Striker	—	—	102	—	—	—	—	103	—	—	102	—	—
Wendy	106	95	98	91	89	101	100	108	104	108	103	100	100
Mean (Bu/A)	67.8	88.6	63.8	60.8	61.8	98.1	75.3	71.4	72.0	78.9	67.6	73.0	81.3
LSD	39.0	20.8	15.6	29.3	19.6	16.0	30.4	15.2	28.8	18.6	22.7	14.7	11.3

[1] The 2009 Crookston and Roseau locations were abandoned due to winterkill. Two-year data are 2007 and 2008.

Minnesota Agricultural Experiment Station
University of Minnesota

Varietal Trials Results

January 2010

Wildrice

Raymie Porter

Cultivated wildrice is grown on about 20,000 acres in Minnesota. Though some wildrice paddies are grown with shattering types, most growers use varieties with nonshattering tendencies.

For flexibility in harvesting, plant varieties resistant to shattering, disease and lodging. Where early killing frost is common, growers should favor varieties of early to medium maturity.

Varieties

Dawn SR – Very early maturing non-shattering variety derived from K2. Apparently fixed for nonshattering. Seeds longer than Itasca by at least 1/64 inch. Approximately 95% of A-width kernels are long-grain. Medium height, with a variety of panicle types. Not resistant to foliar diseases when population density is high. Moderate lodging resistance. Heading date at least two weeks earlier than Itasca. Released 2008 by Minn. AES under licensing agreement.

Itasca – High-yielding, tall, medium-late-maturing variety with superior resistance to seed shattering and fungal brown spot (FBS) disease. Very lodging resistant. Yield is about 50% higher than Petrowske Purple and Franklin.

Shattering loss is about one-third less than Franklin or Petrowske Purple. Significantly more FBS-resistant than Franklin. Taller than Franklin by 3 inches and Petrowske Purple by 4 inches.

Slightly later maturing that Petrowske Purple. Flowers 2 to 3 days after Petrowske Purple or Franklin. Average seed length is somewhat short, similar to Petrowske Purple and GIB-C9, but shorter than Franklin by 1/64 inch.

Panicle type is mixed, including a noticeable percentage of bottlebrush panicles, but declining from 50% frequency without continued selection for the trait.

Released 2002 exclusively to Minnesota growers by the Minnesota Cultivated Wild Rice Council.

Itasca Cycle-12 – Selected from Itasca as a high-yielding, medium-late maturing, long-grain variety with superior resistance to seed shattering, fungal brown spot (FBS) disease and lodging.

Wildrice Planting Rate and Date

Bushel Weight, Pounds.....25
Seeds/Pound.....7,900
Planting Rate, Pounds/Acre.....35
Planting Rate, Seeds/Sq.Ft.....6
Planting Date.....Late Fall

Yield, shattering and lodging ratings for wildrice varieties.

	Grand Rapids				Clearbrook/Gonvick			Aitkin				3-Location Average			
Variety	Yield Lb/A	Shattering %	Lodging Score [3]	FBS Score [4]	Yield Lb/A	Shattering %	Lodging Score [3]	Yield Lb/A	Shattering %	Lodging Score [3]	FBS Score [4]	Yield Lb/A1	Shattering % [2]	Lodging Score [3]	FBS Score [4]
Dawn SR [5]	1,653	5	1.1	4.5	1,610	7	1.5	1,877	2	1.4	4.3	1,734	4	1.3	4.4
Itasca	2,750	4	1.4	3.5	3,065	1	1.5	3,352	3	1.5	3.3	3,054	3	1.5	3.4
Itasca Cycle-12	3,077	4	1.3	3.8	2,407	1	1.8	3,253	4	1.5	3.5	3,013	3	1.5	3.6
LSD 5%	377	2	0.4	1.0	676	2	0.8	490	2	0.4	0.8	279	1	0.3	0.6
Years Represented	08-09	08-09	08-09	09	08	08	08	08-09	08-09	08-09	09	08-09	08-09	08-09	09

[1] Adjusted to 40% moisture.
[2] Expressed as a percentage of shattered seed plus grain yield per unit area.
[3] Using a 1-5 scale where 1 = stems completely erect, 3 = stems averaging 45° angle, 5 = stems prostrate.
[4] Fungal Brown Spot rating using a 1-9 scale where 1 = no significant disease lesions and 9 = completely susceptible (dead).
[5] Dawn SR suffered disproportionately high bird damage at Clearbrook in 2008 because of its early maturity. Bird damage ratings averaged 68% for Dawn SR, 15% for Itasca, and 18% for Itasca Cycle-12.

Seeds 3/64" longer than Itasca, with a substantially higher percentage of long-grain seeds (>20/64") than Itasca. Equivalent to Itasca in yield, shattering resistance, FBS resistance, lodging resistance and maturity.

Panicle type is mixed, including a noticeable percentage of bottlebrush panicles, but declining from 50% frequency without continued selection for the trait.

Released 2007 exclusively to Minnesota growers by the Minnesota Cultivated Wild Rice Council.

Test Plot Research

Test plot establishment and management were supervised by Dan Braaten, Jacques Duquette and Henry Schumer.

Seed length and percent long in A-grade.

	Grand Rapids		Clearbrook/Gonvick		Aitkin		3-Location Average	
Variety	Seed Length, 64ths in.	Long in A-grade, %	Seed Length, 64ths in.	Long in A-grade, %	Seed Length, 64ths in.	Long in A-grade, %	Seed Length, 64ths in. [1]	Long in A-grade, % [2]
Dawn SR	26.3	99	23.8	95	26.2	99	25.8	98
Itasca	26.6	99	24.1	98	26.3	98	26.0	99
Itasca Cycle-12	27.0	100	24.0	97	26.2	99	26.1	99
LSD 5%	0.9	2	1.0	3	0.8	2	0.5	1
Years Represented	2008-09	2008-09	2008	2008	2008-09	2008-09	2008-09	2008-09

[1] Dried, hulled, intact seeds.

[2] Percentage of A-grade seeds (width >3.75/64 in.) that are in the long-grain length category (>20/64 in.), calculated on an estimated volume basis.

Varietal Trials Results

January 2010

Canola

Paul Porter and Derek Crompton

Canola (*Brassica napus and B. rapa*) is a crop developed from oilseed rape by Canadian plant breeders; the first canola variety was licensed in 1974. Canola is used for edible oil extraction and protein feed meal. Canola oil is considered one of the highest quality edible oils available. Considerable acreage of spring canola is grown in Canada. Minnesota acreage increased from about 8,000 acres in 1990 to more than 200,000 acres in 1998. Acreage in recent years has declined to less than 60,000 acres.

The oil in canola seed contains less than 2% erucic acid, compared with 20% to 40% found in oilseed rape. The canola meal remaining after oil extraction contains less than 0.1% glucosinolates (sulfur-containing compounds) compared with about 1% in rapeseed meal. Consequently, canola is also referred to as "double low" or "00" rapeseed. High levels of erucic acid in oilseed rape are hazardous to human health, and high levels of glucosinolates are detrimental in livestock feeds.

Canola (*Brassica napus*) varieties are either spring types or fall-planted winter types. Historically, most all canola grown in Minnesota has been spring types. Fall-planted winter-type canola varieties were evaluated by University of Minnesota researchers more than 15 years ago with limited success due to winter/spring mortality. Since 2002 research on fall-planted winter-type canola varieties has been conducted in Minnesota, again with limited success. Advances in variety development and agronomic production practices provide encouragement that fall-planted winter-type canola varieties can be grown successfully in Minnesota.

Information Sources

The Minnesota Canola Council is a good source for information on canola. The council can be contacted by mail, 4630 Churchill St., Suite 1, St. Paul, MN 55126. Phone 651-638-9883, fax 651-638-0756; email, mncanola@comcast.net.

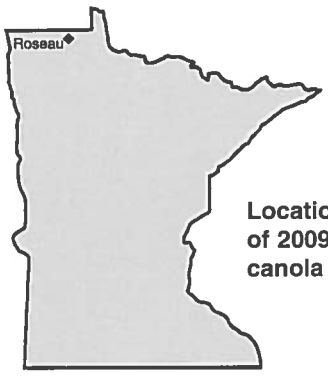
A complete and revised *Canola Growers Manual* on canola production is available from the Canola Council of Canada, 400-167 Lombard Ave, Winnipeg, Manitoba, Canada, R3B 0T6. Phone 204-982-2100, internet, www.canola-council.org. The manual contains detailed information on canola production practices.

Note that the *Canola Growers Manual* is also available online at www.canola-council.org. Please keep in mind when using this manual that not all pesticides used in Canada are legal in the United States. Always confirm the clearance of a pesticide with your local dealer or county extension educator.

Seed yield of canola (Brassica napus) varieties from small plots near Roseau in 2009.*

Company	Variety	Yield, (Lb/Acre)
Bayer	8440 LL	2,300
Bayer	5440 LL	2,300
Bayer	5630 LL	2,200
Monsanto	72522	2,110
Monsanto	88006	2,070
Pioneer	45H28	2,060
Monsanto	72643	2,040
BrettYoung	5525 CL	2,040
Dekalb	72-55	2,020
Monsanto	88117	2,020
Monsanto	88066	1,980
Bayer	5550 LL	1,950
Proseed	30 Caliber	1,950
Monsanto	88124	1,950
Pioneer	45S51	1,950
Monsanto	88061	1,940
BrettYoung	6040	1,920
Monsanto	88075	1,900
Monsanto	64034	1,880
Proseed	50 Caliber	1,880
Monsanto	88058	1,870
Dekalb	52-41	1,870
BrettYoung	6020	1,870
Monsanto	88115	1,850
Proseed	25 Caliber	1,840
Dekalb	30-42	1,820
Monsanto	88007	1,820
Monsanto	88930	1,800
Mean	1971	
LSD (0.05)	NS	
CV (%)	11	

* 23 Roundup Ready, 1 Clearfield (CL) and 4 Liberty Link (LL) varieties.



Location of 2009 canola trials.

2009 Results

The growing season in Roseau County normally sees rainfall of 17 inches from April to September. The 2009 season rainfall was 13 inches, so not overly wet. Planting, however, was delayed into early June due to wet soil conditions. What truly set this year apart was the lack of warm summer temperatures. From April to August, the average temperature was 3 degrees Fahrenheit cooler than normal. September 2009, however, was both warmer than July and the warmest September on record. The growing season was, all-in-all, very nice for canola growth and yield, but yields were not as high as in 2008.

Test Plot Research

Test plot establishment and management were supervised by Paul Porter and Derek Crompton.

Seed yield of canola (Brassica napus) varieties from large plots at the Canola Production Centre near Roseau in 2009.

Company	Variety	Yield, (Lb/Acre)
Bayer	8440	2,130
Bayer	5440	2,060
Croplan	Hyclass 921	1,970
Pioneer	45H28	1,950
Dekalb	72-55	1,910
Proseed	50 Caliber	1,880
Croplan	Hyclass 940	1,880
Croplan	Hyclass 906	1,840
Integra	7121	1,830
Dekalb	30-42	1,820
Croplan	Hyclass 924	1,810
Pioneer	45S51	1,760
Cargill	V2018	1,760
Cargill	V1035	1,740
Cargill	V2030	1,720
Cargill	V1037	1,670
Dekalb	52-41	1,650
Cargill	V2010	1,560
Mean		1,830
LSD (0.05)		170.5
CV (%)		6.6

Minnesota Agricultural Experiment Station
University of Minnesota

Varietal Trials Results

January 2010

Soybean

Jim Orf, Seth Naeve, Phil Schaus and Art Killam

Minnesota Agricultural Experiment Station scientists conduct annual performance tests of appropriately adapted public and private soybean varieties. Companies are charged a fee for each variety they enter to partially cover the costs of conducting these tests. One of the stipulations of the testing program is that the company is marketing or intends to begin marketing the variety in the next growing season.

The 2009 growing season was drier and cooler than normal. Locations in the central zone were affected to a greater degree than locations in the northern and southern zones and harvest was delayed, especially in the northern zone.

Tables 1 to 3 present data from the conventional public and private variety tests conducted at various locations within the northern, central and southern production zones. The map shows test locations and zone boundaries. All of these tests were planted between May 1 and June 3 at planting rates of 160,000 seeds/acre.

Herbicides were used as necessary for good weed control. Row spacings were 30 inches at Becker and Westbrook, 12 inches at Crookston, and 10 inches at other locations. Plot combines were used to harvest the plots.

Table 4 provides results of the very early (northern Minnesota) Minnesota variety tests.

Tables 4 to 8 provide results from specific tests of available transgenic varieties adapted to the far northern, northern, central and southern production zones.

Tables 9 to 11 provide results from the performance tests of soybean cyst-nematode-resistant varieties in "infested" field sites near Lamberton, Rosemount, Westbrook and Gaylord in the southern zone and Rosemount, Gaylord, Grove City and Danvers in the central zone.

Tables 11 to 17 provide performance and characteristics data from special-use soybean variety tests. These tests were conducted to provide reliable data for growers who are interested in producing special-use soybeans, which are typically grown under contract.

Table 18 provides important variety characteristics of publicly developed varieties entered in the 2009 tests.

Tables 19 to 21 present SCN information provided by the Nematology laboratory at the University of Minnesota Southern Research and Outreach Center, Waseca. The data are from greenhouse evaluations of varieties from both the central and southern zone trials on HG type 0 (race 3) of soybean cyst nematode. The level of SCN reproduction from each variety is shown as well as a resistance rating. Field reproductive index data from the trial sites are also shown. Comparisons are best made relative to the susceptible check variety within a column.

HG types for the fields not available at time of publication. Please check the electronic version for updates.

To better understand and use the data provided in these tables, please read the following additional information very carefully.

Seed Treatments

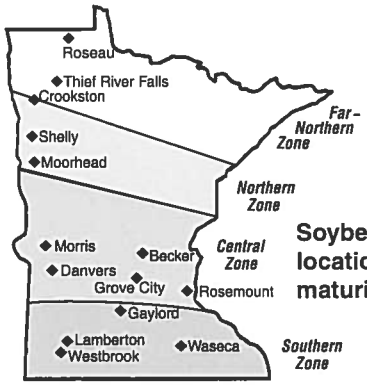
In 2009 entrants were allowed to enter treated seed. The type of seed treatment, as provided by the originator, is designated as follows:
CM = Cruiser Maxx. Go = Gaucho.
SG = SoyGard. SK = SuperKote.
TAG = Trilex/Alegience/Gaucho.
TX = Trilex AL. TX6 = Trilex 6000.
AX = ApronMax. MX = Maxim.
MXL = Maxim XL.
MXA = Maxim+Actellic.
AXM = ApronMax+MaxinXL.
AC = Acceleron.

Research indicates that under some conditions seed treatments can affect the final yield. The exact situations are not always clear but when comparing varieties note if a seed treatment was used on the seed tested.

In some tables the variety type is indicated in a separate column. The designations are as follows; Conventional variety (non-transgenic) CV, LibertyLink (glufosinate resistant) LL, Roundup Ready (glyphosate resistant) RR, and Roundup Ready 2 Yield (glyphosate resistant) R2.

Relative Maturity and Calendar Dates of Maturity

Soybeans respond to changing day length, so the actual calendar date of maturity achievement is affected by latitude. Each variety has a narrow range of north-south adaptation. Soybean yield and quality are assured if a variety arrives at physiologi-



Soybean test locations and maturity zones.

cal maturity before a season-ending freeze occurs. This is determined visually by noting the actual date when 95 percent of the pods show their genetically programmed mature color. These dates for 2009 are provided in the tables. Harvest dates are typically 7 to 14 days later, depending upon drying conditions.

Relative maturity ratings also are provided for each variety. These ratings consist of a number for the maturity group designation (000, 00, 0, 1, 2) followed by a decimal and another number, ranging from 0-9, which indicates a ranking within each maturity group. For example the variety MN0302 indicated as 0.3, making it an early group 0 variety, while MN0901, with a 0.9 rating, is the latest. These values for public varieties are developed after observing them for several years in many locations.

Relative maturity ratings for private varieties in these tables were provided by their owners, and were developed in a similar manner.

Yield

Because maturity is a very important attribute, varieties are arranged in the tables in order of their actual 2009 calendar date of maturity and not yield performance.

Later-maturing varieties usually can be expected to have higher yields than earlier-maturing types. If you wish to correctly compare yields, do so only between varieties with similar calendar dates of maturity, usually within 3 to 5 days. More reliable comparisons can be made using variety yields from several consecutive years. All yield determinations were made from replicated tests harvested with a plot combine.

Yield information is presented as a percent of the mean of the test. The actual mean value is given at the bottom of each table. Values of more than 100 indicate the variety had a yield greater than the mean while those of less than 100 have a yield less than the mean.

LSD values associated with data in these tables are measures of variability within the trials. The LSD values are given on the percent of mean data not the actual yields. If a yield difference between two varieties within a single column exceeds this LSD value you can assume that the higher-yielding variety was truly better yielding.

A 20-percent level of significance is used in all these tables. This means that yield differences exceeding the stated LSD value are real 80 percent of the time.

Chlorosis

Chlorosis ratings are based on how much of the leaf area was yellowing in tests conducted on high lime (high pH) soils near Danvers and Foxhome in 2009. Comparing chlorosis scores of varieties enables you to estimate how well they perform relative to each other. Actual chlorosis ratings can vary depending on the specific site and year of test.

Specific chlorosis scores and evaluation dates from 2009 tests are provided at the web site www.soybeans.umn.edu/home.htm.

A comparison of three different chlorosis rating systems follows:

Numerical Score		Word Description
1-5 scale	1-9 scale	Rating
1 to 2	1 to 2.5	Tolerant (T)
2.1 to 3	2.6 to 5	Moderately Tolerant (MT)
3.1 to 4	5.1 to 7.5	Moderately Susceptible (MS)
4.1 to 5	7.5 to 9	Susceptible (S)

Protein and Oil

Protein and oil values were determined from mature seed using near infrared reflectance analysis equipment. **The table values are for the 2009 season only. Protein and oil information is presented as a percent of the mean for each test. Actual mean values are given at the bottom of each table.** Values of more than 100 indicate the protein and/or oil contents of the variety are greater than the mean value while those of less than 100 have protein and/or oil contents less than the mean. **Absolute values of protein and oil can vary from year to year.**

The mean protein and oil values are expressed on a 13-percent moisture basis. The following formula is used to adjust the protein and oil values to another moisture basis.

$$\frac{100 - \text{desired moisture}}{87} \times \text{protein or oil value given in the table}$$

The value of a bushel of soybeans (APV) based on its oil and protein content can be calculated by:

$$APV = 60\,[Po\,(X) + \frac{Pm}{.44}(Y)]$$

Where:

APV = approximate value of a bushel of soybeans

Po = soybean oil price (in $ per pound)

Pm = price of 44% meal (in $ per pound)*

X = oil content at 13% moisture (in decimals)

Y = protein content at 13% moisture (in decimals)

And:

$$\frac{\text{* price of meal \$/ton}}{2{,}000} = \text{\$/pound}$$

The value of an acre of soybeans can be calculated by multiplying the APV by the yield in bushels per acre.

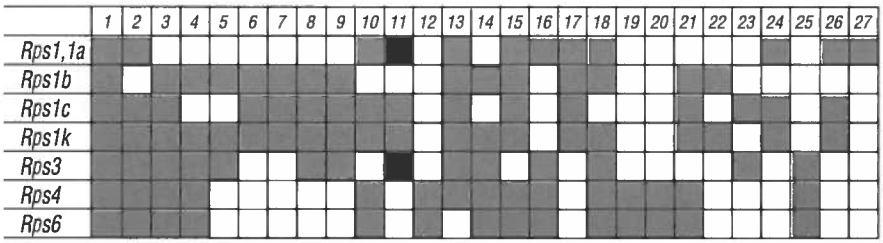
The value of an acre of soybeans can be calculated by multiplying the APV by the yield in bushels per acre.

Phytophthora

Phytophthora root rot can cause significant yield reductions if susceptible varieties are planted in poorly drained, infested fields. There are several known races of this fungus, so it is important to know which are present in a particular field. Genes can be incorporated into varieties to provide resistance to specific races of this disease.

Genes for resistance to various races of Phytophthora root rot are listed in the table below.

Genes for resistance to various races of Phytophthora root rot.



Some published information refers to Phytophthora "tolerance" or "field resistance," which is not race-specific and should not be confused with race-specific resistance as indicated in the above table. Reliable tests for tolerance have not yet been developed.

The data tables in this report indicate which Phytophthora gene or genes is/are present in each variety. A * is used where the claimed resistance was not verified by greenhouse evaluation. A ** following the gene indicates greenhouse bioassay did not agree with originator's designation. The preceding chart indicates which genes provide resistance to the various races.

Soybean Cyst Nematode

Soybean Cyst Nematode (SCN), first identified in Minnesota in 1978, is known to occur in many Minnesota counties where soybeans are grown. Both the area of infestation and numbers of nematodes per unit of soil appear to be increasing. Several races of this pest are known to occur in Minnesota. Significant yield losses can occur when SCN numbers are high. Rotations to non-host crops and planting of resistant varieties can assist both in reducing nematode populations and in reducing their impact on yield.

Yield performance results of susceptible (S), low resistant (LR), moderately resistant (MR) and resistant (R) varieties planted in infested and non-infested fields in central and southern Minnesota are provided in Tables 9 to 11.

The ratings for SCN resistance in these tables were determined using molecular markers. In tables 19 to 21, ratings for SCN resistance were determined using results from greenhouse bioassays. The reproductive index is calculated as the number of nematodes at the end of the season (Pf) divided by the number of nematodes at the beginning of the season (Pi) in soil samples collected from the field plots. The field egg count index (Ei) is the number of SCN eggs expressed as a percent of the susceptible check varieties. Both the reproductive index and the field egg count index are useful indicators of a variety's ability to suppress SCN reproduction.

For proper management of fields with SCN, it is recommended that varieties with an R rating be planted. If the SCN population numbers are relatively low (<3000) a variety with an MR rating might be considered. Varieties rated LR and S should not be considered for planting in fields where SCN is present.

Management information is available from this web site www.soybeans.umn.edu or from the Minnesota Soybean Research and Promotion Council, 360 Pierce Avenue, Suite 110, North Mankato, MN 56003, 1-888-896-9678, www.mnsoybean.org

White Mold

White mold, also known as Sclerotinia stem rot, develops in infested fields when high relative humidity and moderate temperatures occur during soybean flowering. Planting varieties less susceptible in wider row spacings or at lower populations is the most effective method of reducing the severity of white mold.

Accurate ratings for soybean variety resistance to white mold are difficult to obtain because both infection and disease development depend on weather conditions. Because of this variability, a variety's performance can change significantly among locations and years depending on the interaction of plant development, precipitation, relative humidity, and temperature.

White mold severity also tends to be greater if lodging occurs. Growers concerned about variety performance in the presence of white mold should select varieties that show consistently less white mold during several years of testing. MN0091 and MN0701 are public varieties with better than average resistance to white mold. A private variety claiming white mold resistance, but not verified by University of Minnesota lab or field tests is Northstar Genetics NS0024RR.

Brown Stem Rot

Brown stem rot (BSR) is a fungal disease that can cause yield losses in certain situations. This disease occurs most frequently when soybeans follow soybeans but can occur where soybeans are planted every-other year. Resistant varieties, or longer rotations, assist in the management of this disease.

Addresses for companies participating in the 2009 soybean trials.

AgSource Seed	tom.curry@nutechseed.com
Albert Lea Seed	Brian@alseed.com
Anderson Seeds	37825 County Road 63, St. Peter, MN 56082
Dairyland Seed Co., Inc.	rsecrist@dairylandseed.com
Dyna-Gro Seed / CPS	rick.swenson@uap.com
Falk's Seed Farm, Inc.	falkseed@westtechwb.com
G2 Genetics (NuTech)	tom.thompson@nutechseed.com
Gold Country Seed	dschwartz@goldcountryseed.com
Hefty Seed Co.	byounggren@polarcomm.com
Hyland Seeds	rsnobelen@hylandseeds.com
Kruger Seeds, Inc.	blair@krugerseed.com
Monsanto	diane.freeman@monsanto.com
Mustang Seeds	dalenelson@mustangseeds.com
NorthlandOrganic Foods	craig@northlandorganic.com
NorthStar Genetics, Ltd	glenn@rivards.com
NuTech Seed	tom.thompson@nutechseed.com
Peterson Farms Seed	ron@petersonfarmsseed.com
Pioneer Hi-Bred International	mike.johnston@pioneer.com
Prairie Brand Seed	ben@prairiebrandseed.com
Proseed Inc	proseed@ndak.net
Renk Seed	arenk@renkseed.com
Richland Organics	matt@richlandorganics.com
Seeds 2000, Inc.	kwall@seeds2000.net
Sodak Genetics	jack.ingemansen@sdstate.edu
South Dakota AES	jack.ingemansen@sdstate.edu
SunOpta Grains and Foods Group	gene.leach@sunopta.com
Titan Pro SCI	jmeints@kalnet.com
Thunder Seed Inc.	mpetermann7@yahoo.com
Wensman Seed	wensman@wensmanseed.com

MN0304, MN0902CN, MN1302, Freeborn and IA2008R are available public varieties with resistance to BSR. A private variety claiming BSR resistance but not verified by University of Minnesota lab or field tests is North-star Genetics NS0304RR.

Some information refers to "tolerance" or "field resistance." Reliable tests for tolerance or field resistance have not yet been developed.

Special Use Varieties

Interest continues to increase in producing soybeans with special characteristics important to manufacturers of specialty food products, such as tofu, natto, miso and soy milk. Soybean scientists previously developed some of these special-use varieties that were general releases. More recently varieties have been released under exclusive or nonexclusive licenses to specific companies, who then contract with growers for production. For further information contact MCIA at web site www.mncia@tc.umn.edu, phone 612-625-7766.

Brand Names Versus Variety Names

Brand names and variety names are different and are meant to be used for different purposes. Brand names refer to the seed source or the person labeling and selling the seed. Brand does not refer to the genetic makeup of the seed. Variety names refer to the genetic makeup of seed; they may only refer to a specific genetic makeup. Plant breeders are constantly improving varieties but whenever the genetic makeup is changed a new variety is created and must have a new variety name. The rate at which new varieties are being developed has increased dramatically in recent years.

Branding is a useful way for companies to market their products without having to constantly redo the identification and promotional information they offer. If a farmer wishes to spread risk by planting products with different genetic makeup, the variety name must be used to determine if two products are truly different. Relying on a brand name alone to make this determination may not result in different varieties being planted.

Table 1. Performance and characteristics of public and private soybean varieties, northern zone; Crookston, Moorhead and Shelly, 2007-2009.

Variety		Maturity	Yield, Percent of Mean			Percent of Mean		Maturity	Phytophthora	Chlorosis	Seed
or Brand	Originator	Date	2007-2009	2008-2009	2009	Protein	Oil	Rating	Gene	Score	Treat
07005	Thunder	9-22	98	97	96	99	100	0.05	—	3.0	—
MN0071	Minnesota AES	9-22	87	83	78	96	104	00.7	Rps1	3.0	—
Cavalier	No. Dakota AES	9-24	—	87	85	98	99	00.7	Rps6	2.5	—
Jim	No. Dakota AES	9-25	101	97	92	97	101	00.7	S	3.0	—
Bravado	SunOpta	9-27	105	111	113	93	105	0.2	S	3.0	TX
MN0105	Minnesota AES	9-28	99	91	90	104	96	0.1	Rps1c	2.5	—
Valor	SunOpta	9-29	—	114	120	101	95	0.2	Rps1k	2.5	TX
MN0107	Minnesota AES	9-29	—	107	115	100	97	0.1	Rps1k	2.5	—
Traill	No. Dakota AES	9-29	102	103	105	101	99	0.0	S	2.5	—
MN0308CN	Minnesota AES	9-29	—	93	90	99	105	0.3	Rps1k	2.5	—
MN0201	Minnesota AES	10-1	100	100	109	105	100	0.2	Rps1	2.5	—
MN0095	Minnesota AES	10-2	—	113	118	95	106	00.9	Rps1	2.5	—
MN0208CN	Minnesota AES	10-2	—	103	105	101	101	0.2	Rps1	2.5	—
TA8	Thunder	10-3	—	—	86	102	95	0.4	S	3.0	—
MN0101	Minnesota AES	10-4	101	94	90	103	99	0.1	Rps1	3.0	—
SO-0070	SunOpta	*	—	98	102	109	93	0.5	S	2.5	TX
MN0604	Minnesota AES	*	108	108	116	99	103	0.6	Rps6	3.0	—
MN0502	Minnesota AES	*	—	102	112	103	100	0.5	Rps1k	2.5	—
MN0505	Minnesota AES	*	—	110	110	100	102	0.5	Rps1k	2.5	—
TA10	Thunder	*	—	—	88	102	97	0.5	S	3.0	—
SO-0205	SunOpta	*	—	—	89	101	101	0.2	Rps1k	3.0	TX
MK0205	Richland Organics	*	—	88	85	101	101	0.2	Rps1**	3.0	—
MN0504	Minnesota AES	*	—	109	121	92	102	0.5	Rps1	3.0	—
MK0508	Richland Organics	*	—	90	79	98	98	0.5	S	3.0	—
Mean	—	10-3	36.9 bu/a	36.3 bu/a	36.3 bu/a	35.2%	17.3%	—	—	—	—
LSD 20%	—	—	2%	3%	6%	—	—	—	—	—	—

*Variety not mature at killing frost. **Greenhouse test results do not agree with originator's designation.

Table 2. Performance and characteristics of public and private soybean varieties, central zone; Becker, Morris and Rosemount, 2007-2009.

Variety or Brand	Originator	Maturity Date	Yield, Percent of Mean 2007-2009	2008-2009	2009	Percent of Mean Protein	Oil	Maturity Rating	Phytophthora Gene	Chlorosis Score	Seed Treat
Ashtibula	No. Dakota AES	9-11	—	—	102	97	106	0.5	Rps6	2.5	—
MN0502	Minnesota AES	9-11	—	87	98	101	99	0.5	Rps1k	3.5	—
SO-0070	SunOpta	9-11	—	—	93	108	94	0.5	S	2.5	TX
MN0302	Minnesota AES	9-11	87	86	89	98	102	0.3	Rps1k	2.5	—
MN0806CN	Minnesota AES	9-12	98	107	112	97	106	0.8	S	2.5	—
MN0504	Minnesota AES	9-12	—	103	110	94	102	0.5	Rps1	3.5	—
Lambert	Minnesota AES	9-12	98	104	107	98	105	0.7	Rps1	2.0	—
MN0701	Minnesota AES	9-12	93	95	96	101	95	0.7	Rps1	2.0	—
MN0505	Minnesota AES	9-12	—	92	96	99	104	0.5	Rps1k	2.0	—
MK0508	Richland Organics	9-12	—	73	72	96	94	0.5	S	2.5	—
MK0649	Richland Organics	9-12	—	—	62	97	96	0.9	S	2.5	—
Sheyenne	No. Dakota AES	9-13	105	109	109	95	99	0.7	Rps1c	2.0	—
MN0907	Minnesota AES	9-13	—	104	108	98	103	0.9	Rps1k+Rps6	3.5	—
MK1016	Richland Organics	9-13	—	78	83	101	95	1.0	S	3.5	—
MN0606CN	Minnesota AES	9-14	—	—	115	99	101	0.6	—	2.5	—
MN1013	Minnesota AES	9-14	—	96	93	100	101	1.0	Rps1k	2.5	—
Surge	Minn. & S.D. AES	9-16	106	115	121	103	102	0.7	Rps1	2.0	—
Brunet	SunOpta	9-16	—	—	113	98	101	1.4	Rps1k	3.5	TX
MN1401	Minnesota AES	9-16	101	107	106	100	99	1.4	Rps1	2.5	—
MN0903SP	Minnesota AES	9-16	—	95	97	107	93	0.9	Rps1	3.5	—
MN1506	Minnesota AES	9-17	—	105	108	100	101	1.5	Rps1k	2.5	—
SR-09	SunOpta	9-17	—	110	106	100	99	0.9	Rps1k	2.0	TX
MN1410	Minnesota AES	9-19	111	119	122	101	98	1.4	S	2.0	—
Deuel	So. Dakota AES	9-19	—	—	102	102	103	1.1	Rps1k	2.0	—
MN1609	Minnesota AES	9-19	—	98	89	101	102	1.6	Rps6	4.0	—
MN1302	Minnesota AES	9-21	99	104	102	108	95	1.3	Rps1k	2.0	—
Mean	—	9-14	44.5 bu/a	41.8 bu/a	46.5 bu/a	35.5%	17.6%	—	—	—	—
LSD 20%	—	—	3%	4%	7%	—	—	—	—	—	—

Table 3. Performance and characteristics of public and private soybean varieties, southern zone; Lamberton, Waseca and Westbrook, 2007-2009.

Variety or Brand	Originator	Maturity Date	Yield, Percent of Mean 2007-2009	2008-2009	2009	Percent of Mean Protein	Oil	Maturity Rating	Phytophthora Gene	Chlorosis Score	Seed Treat
MN1310SP	Minnesota AES	9-19	—	89	87	101	101	1.3	Rps1k	3.0	—
IA1021	Iowa AES	9-20	105	109	107	101	99	1.6	S	3.0	—
154	NuTech	9-20	—	—	104	100	99	1.5	S	2.5	CM
MN1609	Minnesota AES	9-20	—	101	102	97	103	1.6	Rps6	2.5	—
MN1801	Minnesota AES	9-20	96	96	96	103	101	1.8	Rps1c	3.0	—
MN1410	Minnesota AES	9-20	98	102	93	101	103	1.4	S	3.0	—
176	NuTech	9-21	—	—	118	98	102	1.7	S	2.5	CM
MN1702SP	Minnesota AES	9-21	—	98	104	101	97	1.7	—	3.0	—
212CN	NuTech	9-21	—	—	102	97	106	2.1	S	3.0	CM
IA1022	Iowa AES	9-21	112	112	102	94	108	1.7	S	3.0	—
MN1701CN	Minnesota AES	9-21	—	—	102	101	101	1.7	S	2.5	—
MN1506	Minnesota AES	9-21	—	102	98	99	101	1.5	Rps1k	2.5	—
MN1302	Minnesota AES	9-21	90	93	93	107	96	1.3	Rps1k	3.0	—
1706N	Viking	9-22	—	—	107	98	102	—	S	3.0	Go
IA1020	Iowa AES	9-22	—	107	102	97	98	1.9	—	3.5	—
Davison	So. Dakota AES	9-22	—	—	97	95	102	2.2	Rps1	3.0	—
219CN	NuTech	9-23	—	—	113	97	104	2.2	S	3.0	CM
IA2073	Iowa AES	9-23	—	107	105	97	99	2.1	—	3.5	—
IA1008	Iowa AES	9-23	—	106	100	100	98	2.0	S	2.5	—
IA2067	Iowa AES	9-23	—	90	92	110	95	2.1	—	3.0	—
IA1010	Iowa AES	9-26	—	103	101	104	88	2.2	—	3.0	—
IA1007	Iowa AES	9-26	—	72	63	103	97	2.2	S	3.0	—
IA3024	Iowa AES	9-29	—	116	116	96	101	3.0	Rps1k	3.0	—
Mean	—	9-22	46.7 bu/a	45.0 bu/a	52.3 bu/a	34.7%	17.8%	—	—	—	—
LSD 20%	—	—	2%	3%	5%	—	—	—	—	—	—

Table 4. Performance and characteristics of conventional and Roundup Ready public and private soybean varieties, far northern zone; Crookston, Roseau and Thief River Falls, 2007-2009.

Variety or Brand	Originator	Maturity Date	Yield, Percent of Mean 2007-2009	2008-2009	2009	Percent of Mean Protein	Oil	Maturity Rating	Phytophthora Gene	Chlorosis Score	Seed Treat	Variety Type
Hardnut	SunOpta	9-25	—	—	97	99	93	0.3	S	2.0	TX	CV
NS 0024RR	NorthStar Genetics	9-26	—	—	92	98	103	0.4	S	2.0	CM	RR
80-04	Proseed	9-28	—	—	99	98	103	0.4	S	2.0	CM	RR
K-004RR	Kruger	9-28	—	99	98	103	98	0	S	2.0	CM	RR
NS 0011RR	NorthStar Genetics	9-28	—	—	95	98	103	0.4	S	2.0	CM	RR
00 59	Hefty Seed	9-29	—	—	105	101	101	0.01	S	2.0	—	RR
MN0071	Minnesota AES	9-30	85	84	89	99	101	00.7	Rps1	3.5	—	CV
NS 0034RR	NorthStar Genetics	10-1	—	—	119	97	103	0.5	S	3.0	CM	RR
6005	NuTech	10-1	—	—	114	99	95	0.01	S	2.5	CM	RR
30005RR	Thunder	10-2	—	—	108	99	101	0.05	—	2.5	—	RR
New 0.05	Dyna-Gro Seed	10-3	—	—	115	97	103	0.05	S	2.5	CM	RR
M-0096ERR	Mustang	10-3	107	107	114	101	103	0.09	S	2.0	TX	RR
W 20074RR	Wensman Seed	10-3	—	—	111	96	102	0.07	Rps1k	3.0	CM	RR
MN0106RR	Minnesota AES	10-3	96	98	108	100	98	0.1	Rps1k	2.0	—	RR
PB-00639RR	Prairie Brand	10-3	—	—	106	99	101	0.06	Rps1k	2.0	CM	RR
6019	NuTech	10-3	—	—	105	104	99	0.1	Rps1k	2.5	CM	RR
29004RR	Thunder	10-3	—	—	104	99	105	0.04	Rps1k	2.0	—	RR
00 86	Hefty Seed	10-3	—	—	101	98	101	0.01	Rps1k	2.0	—	RR
Traill	No. Dakota AES	10-3	94	91	80	105	95	0.0	S	2.0	—	CV
MN0105	Minnesota AES	10-3	94	91	77	105	94	0.1	Rps1c	2.5	—	CV
00 79	Hefty Seed	10-3	—	—	74	101	99	0.01	S	4.0	—	RR
0090RR	NuTech	10-4	—	—	124	101	103	0.09	S	2.0	CM	RR
W 20092RR	Wensman Seed	10-4	—	—	119	101	103	0.09	Rps1k	2.0	CM	RR
K-009+RR	Kruger	10-4	108	111	118	100	101	0.01	S	2.0	CM	RR
PB-00918RR	Prairie Brand	10-4	—	109	113	101	102	0.09	Rps1k	2.0	CM	RR
0081RR	Seeds 2000	10-4	—	—	109	98	101	0.08	Rps1k	2.5	CM	RR
NS 0084RR	NorthStar Genetics	10-4	—	—	108	98	103	0.8	S	2.0	CM	RR
M-0070RR	Mustang	10-4	—	—	102	100	101	0.07	S	2.0	TX	RR
PB-00965RR	Prairie Brand	10-5	—	110	108	101	102	0.09	S	3.5	CM	RR
32J01	Dyna-Gro Seed	10-5	99	95	91	99	103	0.1	S	2.0	CM	RR
00 99	Hefty Seed	10-5	—	—	89	99	102	0.01	Rps1k	2.0	—	RR
Valor	SunOpta	*	—	107	114	102	92	0.2	Rps1k	2.0	TX	CV
MN0107	Minnesota AES	*	—	95	105	104	92	0.1	Rps1k	2.0	—	CV
6022	NuTech	*	—	95	87	97	101	0.1	S	2.5	CM	RR
K-007RR	Kruger	*	—	111	120	99	99	0.01	S	2.0	CM	RR
9008RR	Gold Country Seed	*	—	102	112	96	96	0.8	S	2.0	AX	RR
DSR-C770/RR	Dairyland	*	—	—	108	102	97	0.7	S	2.0	—	RR
PB-0199RR	Prairie Brand	*	—	—	97	101	103	0.1	Rps1k	2.0	CM	RR
Bravado	SunOpta	*	107	104	113	97	98	0.2	S	2.0	TX	CV
EX2009.008RR	PFS	*	—	—	118	100	97	0.08	S	3.5	TX	RR
MN0095	Minnesota AES	*	101	100	100	99	103	00.9	Rps1	2.0	—	CV
29008RR	Thunder	*	—	—	95	100	99	0.08	—	2.5	—	RR
OT05-18	Meridian Seeds	*	—	—	92	99	106	0.7	—	4.5	AX	CV
1002RR	PFS	*	—	—	88	98	101	0.2	Rps1k	2.5	TX	RR
PB-0218RR	PBR	*	—	94	81	99	101	0.2	S	2.5	CM	RR
EX2009.006RR	PFS	*	—	—	110	99	101	0.06	S	2.5	TX	RR
MN0101	Minnesota AES	*	101	100	100	102	99	0.1	Rps1	2.0	—	CV
0905RR	Gold Country Seed	*	—	—	130	100	99	0.4	Rps1k	2.0	AX	RR
80-20	Proseed	*	—	—	90	97	101	0.1	S	3.0	CM	RR
AG0401	Asgrow	*	—	—	106	101	99	0.4	Rps1	2.0	AC	RR
0901RR	Gold Country Seed	*	—	90	81	97	101	0.1	S	2.5	AX	RR
2501RR	Thunder	*	—	—	73	97	102	0.1	—	2.5	—	RR
90Y20	Pioneer Brand	*	—	106	106	102	99	0.2	Rps1k	2.0	CM	RR
PB-039X	PBR	*	—	—	105	105	97	0.3	Rps1c	4.0	AC	R2
SO-0205	SunOpta	*	—	—	74	106	97	0.2	Rps1k	2.0	TX	CV
1000RR	PFS	*	—	—	100	102	99	0	S	3.0	TX	RR
AG0202	Asgrow	*	—	—	84	99	96	0.2	Rps1k	3.0	AC	RR
RY0409	Monsanto	*	—	—	100	100	95	0.4	S	2.5	AC	R2
K-028RR	Kruger	*	—	94	80	105	97	0.02	Rps1k	3.0	CM	RR
PB-0356RR	PBR	*	108	105	109	101	101	0.4	Rps1	2.0	CM	RR
AG0604	Asgrow	*	—	—	68	97	105	0.6	Rps1k	2.5	AC	RR
Mean	—	10-6	34.3 bu/a	30.9 bu/a	26.3 bu/a	35.4%	17.4%	—	—	—	—	—
LSD 20%	—	—	3%	4%	8%	—	—	—	—	—	—	—

* Variety not mature at killing frost.

Table 5. Performance and characteristics of Roundup Ready soybean varieties, northern zone; Crookston, Moorhead and Shelly, 2007-2009.

Variety		Maturity	Yield, Percent of Mean			Percent of Mean		Maturity	Phytophthora	Chlorosis	Seed	Variety
or Brand	Originator	Date	2007-2009	2008-2009	2009	Protein	Oil	Rating	Gene	Score	Treat	Type
PRIME	SunOpta	9-20	—	—	48	110	91	0.6	Rps1c	1.5	—	R2
RG7008RR	Rough Rider Genetics	9-25	83	82	73	102	97	00.7	Rps1k	3.0	—	RR
0081RR	Seeds 2000	9-27	105	107	104	96	104	0.08	Rps1k	2.0	CM	RR
K-009+RR	Kruger	9-27	105	103	96	103	102	0.01	S	1.5	CM	RR
RR Ridgeway	Hyland Seeds	9-27	92	93	79	98	99	0.2	S	3.5	—	RR
MN0106RR	Minnesota AES	9-28	—	89	84	103	96	0.1	Rps1k	2.0	—	RR
PB-0218RR	PBR	9-28	—	82	64	100	101	0.2	S	2.0	CM	RR
RG200RR	Rough Rider Genetics	9-29	—	96	100	104	97	0.0	Rps1	2.0	—	RR
6022	NuTech	9-29	—	97	95	99	99	0.6	S	3.5	CM	RR
1002RR	PFS	9-30	—	—	93	100	99	0.2	Rps1k	3.0	TX	RR
HS 02R28	Hyland Seeds	9-30	—	92	89	99	97	0.2	S	2.0	—	RR
PB-0554RR	Prairie Brand	10-2	109	111	113	99	102	0.5	S	3.0	CM	RR
RG600RR	Rough Rider Genetics	10-3	98	97	100	100	103	0.1	S	2.0	—	RR
2905RR	Thunder	10-4	—	—	110	99	100	0.5	Rps1k	2.0	—	RR
PB-0498RR	Prairie Brand	10-5	—	117	113	101	100	0.4	Rps1k	3.5	CM	RR
2901RR	Thunder	10-5	—	101	106	99	99	0.1	—	2.0	—	RR
PB-039X	PBR	10-5	—	—	102	103	96	0.3	S	2.0	CM	R2
37P05	Dyna-Gro Seed	*	—	—	107	99	101	0.5	Rps1k	2.0	CM	RR
4906LL	Thunder	*	—	—	99	101	102	0.6	Rps1k	1.5	—	LL
LS0624RR	Mustang	*	—	—	95	98	103	0.6	S	2.0	—	RR
NS 0214RR	NorthStar Genetics	*	—	—	93	98	98	0.2	S	2.5	CM	RR
DSR-0401/RR	Dairyland	*	107	105	92	102	101	0.4	S	2.0	—	RR
80-50	Proseed	*	—	—	87	99	102	0.5	Rps1k	2.5	CM	RR
NS 0514RR	NorthStar Genetics	*	—	—	112	98	102	0.4	Rps1k	2.0	CM	RR
90Y42	Pioneer Brand	*	—	—	108	97	102	0.4	Rps1k	2.0	CM	RR
W 2025RR	Wensman	*	—	—	92	104	98	0.2	Rps1k	2.0	CM	RR
DSR-0602/RR	Dairyland	*	—	114	108	99	104	0.6	Rps1c	2.5	—	RR
6049	NuTech	*	—	—	89	95	103	0.4	S	2.5	CM	RR
K-028RR	Kruger	*	—	95	87	103	98	0.02	Rps1k	2.5	CM	RR
DSR-0701/RR	Dairyland	*	106	107	95	101	100	0.7	Rps1k	3.5	—	RR
6059	NuTech	*	—	—	113	101	100	0.5	Rps1c	2.0	CM	RR
MN0503RR	Minnesota AES	*	88	92	92	105	98	0.5	Rps1	3.5	—	RR
RR Rockport	Hyland Seeds	*	—	—	91	102	103	0.6	S	2.0	—	RR
RS050RR	Renk Seed	*	—	—	113	97	104	0.5	Rps1c#	2.5	—	R2
2906RR	Thunder	*	—	—	125	98	98	0.6	—	1.5	—	RR
90-40	Proseed	*	—	—	123	97	104	0.4	S	2.5	CM	RR
PB-0356	PBR	*	—	—	115	98	102	0.4	Rps1#	2.0	CM	RR
NS0304RR	NorthStar Genetics	*	—	108	111	101	96	0.3	S	3.0	CM	RR
PB-059X	PBR	*	—	—	106	97	101	0.5	Rps1k	2.0	CM	R2
0905RR	PFS	*	—	—	105	101	102	0.5	Rps1#	2.0	TX	RR
K2X06A9	Kruger	*	—	—	100	109	96	0.06	—	3.0	AC	R2
M-047RR	Mustang	*	110	114	115	98	104	0.4	Rps1	2.0	TX	RR
W 2030RR	Wensman	*	—	—	101	101	103	0.3	Rps1#	3.5	CM	RR
MN0309RR	Minnesota AES	*	—	90	92	103	100	0.3	Rps6	3.0	—	RR
11R05RR	PFS	*	—	—	114	98	101	0.5	S	2.5	TX	R2
EXP 0.5RR	Dyna-Gro Seed	*	—	—	111	96	104	0.5	Rps1c	1.5	CM	RR
90Y50	Pioneer Brand	*	—	—	109	100	102	0.5	Rps1k	2.0	CM	RR
0806RR	PFS	*	—	—	108	99	100	0.6	S	2.0	TX	RR
MN0401RR	Minnesota AES	*	97	99	107	100	99	0.4	Rps1	2.5	—	RR
K2X05A9	Kruger	*	—	—	106	98	100	0.05	Rps1k	1.5	AC	R2
0636RR	NuTech	*	—	—	125	99	99	0.6	S	3.5	CM	RR
NS 0413RR	NorthStar Genetics	*	—	—	119	99	103	0.4	Rps1c	2.0	CM	RR
W 2069RR	Wensman	*	—	—	107	99	98	0.6	Rps1c#	2.5	CM	RR
DSR-0747/R2Y	Dairyland	*	—	—	116	101	97	0.7	Rps1c	3.5	—	R2
32T03	Dyna-Gro Seed	*	—	—	104	99	104	0.3	Rps1	2.5	CM	RR
G2 90-50	Proseed	*	—	—	94	99	98	0.5	Rps1k	2.5	—	R2
PB-071X	Sansgaard	*	—	—	93	102	97	0.7	Rps1c	3.0	AC	R2
PB-0199RR	Prairie Brand	*	—	—	92	97	102	0.1	Rps1k	2.0	CM	RR
Mean	—	10-10	38.1 bu/a	35.3 bu/a	36.6 bu/a	33.7%	18.1%	—	—	—	—	—
LSD 20%	—	—	2%	3%	5%	—	—	—	—	—	—	—

Greenhouse test results do not agree with originator's designation.
* Variety not mature at killing frost.

Table 6. Performance and characteristics of Roundup Ready soybean varieties, central zone; Becker, Morris and Rosemount, 2007-2009.

Variety or Brand	Originator	Maturity Date	Yield, Percent of Mean 2007-2009	2008-2009	2009	Percent of Mean Protein	Oil	Maturity Rating	Phytophthora Gene	Chlorosis Score	Seed Treat	Variety Type
MN0506RRCN	Minnesota AES	9-15	—	—	90	107	100	0.5	S	2.5	—	RR
MN0503RR	Minnesota AES	9-15	90	88	88	103	101	0.5	Rps1	3.5	—	RR
11R15RR	PFS	9-16	—	—	84	105	101	1.5	Rps1c	3.0	TX	R2
RR RocKport	Hyland Seeds	9-16	90	83	81	99	105	0.6	S	2.5	—	RR
K-058RR	KSC/Challenger	9-16	—	90	74	99	99	0.1	Rps1k	2.5	CM	R2
W 2079RR	Wensman	9-17	—	—	98	99	100	0.7	S	3.0	CM	RR
DSR-0949/R2Y	Dairyland	9-17	—	—	86	104	101	0.9	Rps1c	2.5	—	RR
W 2112RR	Wensaman	9-18	—	—	90	99	101	1.1	Rps1k+Rps6	3.5	CM	R2
SD1093RR	Sodak Genetics	9-20	—	101	100	99	104	0.9	Rps1k+Rps6	3.0	—	RR
W 2090RR	Wensman	9-20	—	—	97	99	101	0.9	S	3.0	CM	RR
PB-099X	PBR	9-20	—	—	94	102	103	0.9	Rps1c	3.5	—	R2
6098	G2 (NuTech)	9-20	—	—	92	99	98	0.9	Rps1k	2.5	CM	RR
RR Richwood	Hyland Seeds	9-20	100	93	92	97	95	0.9	S	3.5	—	RR
MN0309RR	Minnesota AES	9-20	—	—	91	100	103	0.5	Rps6	3.5	—	RR
AG0803	Asgrow	9-21	—	110	113	98	102	0.8	Rps1k	3.0	CM	RR
2081RR	Seeds 2000	9-21	—	—	110	94	101	0.8	Rps1k	3.0	CM	RR
Sheyenne	No. Dakato AES	9-21	—	—	93	99	99	0.7	Rps1c	2.5	—	RR
80-90	Proseed	9-22	—	—	103	102	101	0.9	Rps1c	3.0	CM	RR
PB-109X	Sansgaard	9-22	—	—	103	103	98	1.0	Rps1c	3.5	AC	RR
M-089RR	Mustang	9-22	—	100	101	97	96	0.8	Rps1k	3.0	TX	RR
DSR-1200/R2Y	Dairyland	9-22	—	—	98	101	97	1.2	Rps1k	4.0	—	RR
K-072+RR	Kruger	9-22	108	99	97	99	100	0.1	Rps1c	4.0	CM	R2
0990RR	NuTech	9-22	—	—	95	101	98	0.9	S	3.5	CM	R2
K2X10A9	Kruger	9-22	—	—	93	107	95	1.0	Rps1c	3.5	AC	R2
2120RR	Seeds 2000	9-23	111	100	103	98	101	1.2	Rps1k	3.0	CM	RR
MN1107RR	Minnesota AES	9-23	101	95	101	99	101	1.1	Rps1	2.5	—	RR
6088	G2 (NuTech)	9-23	—	—	99	101	99	0.8	S	3.5	CM	RR
K2X11B9	Kruger	9-23	—	—	98	99	96	1.1	—	2.5	AC	R2
91-Y10	Proseed	9-23	—	—	97	99	99	1.1	Rps1c	3.0	CM	RR
0886RR	NuTech	9-23	—	—	92	99	99	0.8	S	3.0	CM	RR
1013RR	PFS	9-23	—	—	84	103	99	1.3	S	3.5	TX	RR
DSR-1423/RRSTS	Dairyland	9-24	—	—	117	99	101	1.4	S	4.5	—	RR
7154	NuTech	9-24	—	115	117	103	101	1.5	S	3.5	CM	R2
RS110R2	Renk Seed	9-24	—	—	105	98	98	1.1	Rps1c	3.0	CM	R2
M-139RR	Mustang	9-24	—	101	97	103	99	1.3	S	2.5	—	LL
MN1410	Minnesota AES	9-24	—	—	94	103	98	1.4	S	3.0	—	RR
K2X15B9	KSC/Challenger	9-25	—	—	116	105	96	1.5	Rps1c	3.0	AC	RR
7151	G2 (NuTech)	9-25	—	—	113	101	95	1.5	Rps1k	3.5	CM	CV
AG1506	Asgrow	9-25	—	112	111	97	103	1.5	Rps1k	3.5	CM	RR
4910LL	Thunder	9-25	—	—	103	107	96	1.0	Rps1k	3.0	—	R2
2810RR	Thunder	9-25	—	—	102	99	99	1.0	—	3.0	—	RR
81-30	Proseed	9-25	—	—	96	100	101	1.3	S	3.5	CM	R2
6159	G2 (NuTech)	9-26	—	—	133	97	103	1.5	Rps1k	3.0	CM	RR
1015RR	PFS	9-26	—	—	119	96	103	1.5	Rps1k	4.5	TX	RR
153 CNR	Anderson	9-26	—	—	118	96	105	1.5	Rps1k	3.0	—	RR
PB-1578NRR	Prairie Brand	9-26	—	116	118	97	105	1.5	Rps1k	3.0	CM	R2
15M2	Titan Pro SCI	9-26	—	—	116	97	101	1.5	Rps1c	3.0	—	R2
K2X14A9	Kruger	9-26	—	—	114	95	99	1.4	Rps1c	2.5	AC	R2
PB-159X	PBR	9-26	—	—	111	98	100	1.5	Rps1c	3.0	AC	R2
PB-155X	PBR	9-26	—	—	110	97	99	1.2	Rps1c	3.0	—	R2
W 2152NRR	Wensman	9-26	—	—	109	97	105	1.5	Rps1k	3.0	CM	R2
81-50N	Proseed	9-26	—	—	101	96	105	1.5	Rps1k	2.5	CM	R2
PB-141X	Prairie Brand	9-27	—	—	124	96	99	1.4	Rps1c	3.0	AC	RR
RS140NR2	Renk Seed	9-29	—	—	124	98	105	1.4	Rps1c	3.0	CM	RR
Mean	—	9-22	43.4 bu/a	43.1 bu/a	43.9 bu/a	34.7%	17.5%	—	—	—	—	—
LSD 20%	—	—	3%	4%	7%	—	—	—	—	—	—	—

Table 7. Performance and characteristics of Roundup Ready soybean varieties, relative maturity (RM) >1.5, central zone; Becker, Morris and Rosemount, 2009.

Variety or Brand	Originator	Maturity Date	Yield, Percent of Mean 2007-2009	2008-2009	2009	Percent of Mean Protein	Oil	Maturity Rating	Phytophthora Gene	Chlorosis Score	Seed Treat	Variety Type
M-168RR	Mustang	9-27	—	—	81	93	105	1.6	S	3.0	—	RR
RS160NR2	Renk Seed	9-28	—	—	117	100	99	1.6	Rps1k	3.0	CM	R2
PB-1885NRR	PBR	9-28	—	—	112	97	105	1.8	Rps1k	3.0	Go	RR
17M3	Titan Pro SCI	9-28	—	—	110	101	98	1.7	Rps1k	3.0	—	R2
PB-1739VNRR	Prairie Brand	9-28	—	—	110	101	97	1.6	S	3.0	CM	RR
161 R2	Anderson	9-28	—	—	105	99	100	1.7	Rps1k	3.0	AX	R2
AG1802	Asgrow	9-28	—	—	101	98	103	1.8	Rps1k	3.0	CM	RR
91Y80	Pioneer Brand	9-28	—	—	100	100	99	1.8	Rps1k+Rps 6	2.5	CM	RR
1788NRR	Viking	9-28	—	—	99	99	101	1.7	Rps1k	3.5	Go	RR
19M7	Titan Pro SCI	9-28	—	—	66	100	94	1.9	Rps1c	3.5	—	R2
PB-179X	Prairie Brand	9-29	—	—	117	99	101	1.7	Rps1k	3.0	AC	R2
181 CNR	Anderson	9-29	—	—	114	98	101	1.7	Rps1k	3.0	—	RR
PB-219X	Sansgaard	9-29	—	—	112	100	98	1.9	—	3.0	AC	R2
7199	NuTech	9-29	—	—	106	98	103	1.9	Rps1c	3.0	CM	RR
K-189RR/SCN	KSC/Challenger	9-29	—	—	106	103	99	1.8	Rps1k	3.0	CM	RR
7201	AgSource	9-29	—	—	105	98	102	2.0	Rps1c	3.0	CM	RR
20M1	Titan Pro SCI	9-29	—	—	101	97	101	2.0	Rps1k	3.0	—	R2
6191	AgSource	9-29	—	—	91	99	102	1.9	S	3.0	CM	RR
K2X21A9	KSC/Challenger	9-29	—	—	86	104	97	2.1	—	2.5	AC	R2
RS179NRR	Renk Seed	9-30	—	—	104	102	98	1.7	S	3.0	—	RR
92Y20	Pioneer Brand	9-30	—	—	104	97	102	2.2	Rps1k	3.0	CM	RR
AG2108	Asgrow	9-30	—	—	101	99	98	2.1	S	3.0	CM	RR
92Y10	Pioneer Brand	9-30	—	—	101	101	101	2.1	Rps1k	3.0	CM	RR
SD1161RR/SCN	Sodak Genetics	9-30	—	—	93	101	93	1.6	Rps1	3.0	—	CV
DSR-2200/RR	Dairyland	9-30	—	—	82	105	103	2.2	S	3.0	—	RR
3199L	AgSource	10-2	—	—	91	102	105	1.9	Rps1k	3.0	TX	LL
3229L	AgSource	10-2	—	—	88	108	96	2.2	S	3.0	TX	LL
Mean	—	9-29	—	—	52.5 bu/a	34.7%	17.9%	—	—	—	—	—
LSD 20%	—	—	—	—	5%	—	—	—	—	—	—	—

Table 8. Performance and characteristics of Roundup Ready soybean varieties, southern zone; Lamberton, Waseca and Westbrook, 2007-2009.

Variety or Brand	Originator	Maturity Date	Yield, Percent of Mean 2007-2009	2008-2009	2009	Percent of Mean Protein	Oil	Maturity Rating	Phytophthora Gene	Chlorosis Score	Seed Treat	Variety Type
MN1504RR	Minnesota AES	9-19	88	91	92	101	102	1.5	Rps1k	4.0	—	RR
91Y80	Pioneer Brand	9-21	—	—	92	103	99	1.8	Rps1k+Rps 6	3.0	CM	RR
PB-201X	PBR	9-22	—	—	101	103	97	2.0	Rps1c	3.0	AC	R2
K2-1901	Kruger	9-22	—	—	100	99	99	1.9	Rps1k	3.0	AC	R2
PB-179X	Prairie Brand	9-22	—	—	100	102	99	1.7	Rps1k	3.5	AC	R2
PB-207X	Sansgaard	9-22	—	—	99	102	98	2.0	—	3.5	AC	R2
AG1802	Asgrow	9-22	—	—	97	99	104	1.8	Rps1k	4.0	CM	RR
92Y20	Pioneer Brand	9-22	—	—	94	97	104	2.2	Rps1k	3.5	CM	RR
AG1703	Asgrow	9-22	—	99	92	96	104	1.7	Rps1k	3.5	CM	RR
PB-1999NR2	Prairie Brand	9-22	—	—	91	100	97	1.9	Rps1k	3.0	AC	R2
PB-2056NRR	PBR	9-23	107	104	109	101	99	2.0	Rps1c	3.0	Go	RR
AG2002	Asgrow	9-23	—	103	106	98	103	2.0	Rps1c	3.0	CM	RR
19M7	Titan Pro SCI	9-23	—	—	106	103	94	1.9	Rps1c	3.0	—	R2
PB-2058NRR	Prairie Brand	9-23	—	105	106	101	99	2.0	Rps1k	3.0	Go	RR
DST20-002/RR	Dairyland	9-23	—	—	105	102	99	2.0	S	3.0	—	RR
L199	Viking	9-23	—	—	102	102	98	1.9	Rps1c	3.5	TX	LL
1808RN	NuTech	9-23	—	—	101	99	99	1.8	Rps1c	4.0	CM	RR
AG2108	Asgrow	9-23	—	102	101	100	98	2.1	S	3.5	CM	RR
PB-214X	Sansgaard	9-23	—	—	101	101	97	2.1	Rps1c	3.0	AC	R2
202 R2	Anderson	9-23	—	—	100	97	102	2.0	Rps1k	3.0	AX	R2
RS200NR2	Renk Seed	9-23	—	—	99	100	98	2.0	Rps1k	3.0	CM	R2
PB-203X	Sansgaard	9-23	—	—	99	101	97	2.0	Rps1c	3.5	AC	R2
RS204NRR	Renk Seed	9-23	—	—	94	100	103	2.0	Rps1k	3.0	—	RR
201 CNR	Anderson	9-23	—	93	93	96	104	2.0	Rps1c	3.0	—	RR
1908CNRR	Viking	9-23	—	97	91	98	104	1.9	Rps1k	3.5	Go	RR
2000R2N	Viking	9-23	—	—	90	99	99	2.0	Rps1k	3.0	CM	R2
7208	G2 (NuTech)	9-23	—	—	89	99	104	2.0	Rps1c	2.5	CM	RR
MN1803RR	Minnesota AES	9-23	84	82	85	100	102	1.8	Rps1	3.0	—	RR

Table 8 (continued). Performance and characteristics of Roundup Ready soybean varieties, southern zone; Lamberton, Waseca and Westbrook, 2007-2009.

Variety or Brand	Originator	Maturity Date	Yield, Percent of Mean 2007-2009	2008-2009	2009	Percent of Mean Protein	Oil	Maturity Rating	Phytophthora Gene	Chlorosis Score	Seed Treat	Variety Type
K2-2101	Kruger	9-24	—	—	109	98	101	2.1	Rps1c	3.0	AC	R2
K-201RR/SCN	Kruger	9-24	108	106	105	100	101	2.0	Rps1c	2.5	CM	RR
21M2	Titan Pro SCI	9-24	—	—	104	99	102	2.1	Rps1c	3.0	—	R2
92Y30	Pioneer Brand	9-24	—	103	103	99	101	2.3	Rps1k	3.5	CM	RR
191 CNR	Anderson	9-24	—	97	101	96	104	1.9	Rps1k	3.5	—	RR
K2X19B9	Kruger	9-24	—	—	100	104	95	1.9	Rps1c	3.0	AC	R2
PB-2117NRR	PBR	9-24	106	101	100	101	98	2.1	S	3.0	Go	RR
PB-2207NRR	Sansgaard	9-24	106	104	99	96	104	2.2	Rps1k	3.0	Go	RR
6247	G2 (NuTech)	9-25	—	—	107	99	100	2.4	Rps1k	3.0	CM	RR
6224	AgSource	9-25	—	—	107	102	96	2.2	S	3.5	—	RR
NS 2105R2	NorthStar Genetics	9-25	—	—	106	99	101	2.1	Rps1c	3.0	CM	R2
DSR-2560/RR	Dairyland	9-25	—	—	105	104	95	2.5	S	3.0	—	RR
2324+RN	AgSource	9-25	—	—	103	99	101	2.3	S	5.0	—	RR
RS210NR2	Renk Seed	9-25	—	—	102	98	101	2.1	Rps1c	4.0	CM	R2
ML2269	Mustang	9-25	—	—	101	101	97	2.2	S	4.0	—	LL
PB-2099NR2	Prairie Brand	9-25	—	—	101	98	102	2.0	Rps1c	3.5	AC	R2
7199	NuTech	9-25	—	—	100	102	98	1.9	S	4.0	CM	RR
W 2222NRR	Wensman	9-25	—	—	100	96	102	1.9	Rps1c	3.5	CM	R2
7222	NuTech	9-25	—	103	97	95	103	2.2	Rps1k	3.5	CM	RR
7226	G2 (NuTech	9-25	—	99	94	98	106	2.2	Rps1k	3.0	CM	RR
DSR-2300/RR	Dairyland	9-26	—	106	108	102	95	2.3	Rps1k *	3.5	—	RR
7212	G2 (NuTech)	9-26	—	—	107	96	104	2.1	Rps1k	3.5	CM	RR
L200N	Viking	9-26	—	—	103	102	97	2.0	Rps1k	3.0	TX	LL
PB-2439NR2	PBR	9-26	—	—	102	101	99	2.3	Rps1c	4.0	AC	R2
BT 7219NR	NorthStar Genetics	9-26	—	—	99	103	98	2.1	Rps1k	3.5	CM	RR
24M2	Titan Pro SCI	9-26	—	—	99	100	99	2.4	Rps1c	3.5	—	R2
23M9	Titan Pro SCI	9-27	—	—	114	101	97	2.3	S	4.5	—	R2
3229L	AgSource	9-27	—	—	105	106	93	2.2	S	3.5	—	LL
DSR-2200/RR	Dairyland	9-27	—	104	101	104	97	2.2	S	3.0	—	RR
6244	NuTech	9-27	—	—	92	97	100	2.4	S	3.5	CM	RR
3248L	AgSource	9-28	—	—	108	98	98	2.4	Rps1k	4.0	—	LL
Mean	—	9-24	50.8 bu/a	51.7 bu/a	53.7bu/a	33.7%	18.6%	—	—	—	—	—
LSD 20%	—	—	2%	3%	6%	—	—	—	—	—	—	—

*Greenhouse test results do not agree with originator's designation.

Table 9. Performance and characteristics of soybean varieties,central zone; at soybean-cyst-nematode-infested sites (Danvers, Gaylord, Grove City and Rosemount), 2007-2009.

Variety or Brand	Originator	Maturity Date	Yield, Percent of Mean 2007-2009	2008-2009	2009	Percent of Mean Protein	Oil	Maturity Rating	Phytophthora Gene	Chlorosis Score	Seed Treat	SCN Rating	Variety Type
MN0208CN	Minnesota AES	9-16	—	81	77	106	98	0.2	Rps1	2.5	R	—	CV
MN0308CN	Minnesota AES	9-16	77	72	66	103	101	0.3	Rps1k	2.5	R	—	CV
Sheyenne	No. Dakota AES	9-18	99	95	96	99	98	0.7	Rps1c	2.5	S	—	CV
MN0506RRCN	Minnesota AES	9-18	—	80	76	107	99	0.5	S	3.0	R	—	RR
MN1011CN	Minnesota AES	9-19	103	94	88	100	101	1.0	Rps1	3.0	R	—	CV
MN0902CN	Minnesota AES	9-19	100	94	85	105	95	0.9	S	2.5	R	—	CV
MN0606CN	Minnesota AES	9-20	102	99	97	100	101	0.6	S	2.5	R	—	CV
MN0806CN	Minnesota AES	9-20	105	100	95	99	105	0.8	S	3.0	R	—	CV
MN0908CN	Minnesota AES	9-21	—	101	97	101	99	0.9	S	2.5	R	—	CV
MN1106CN	Minnesota AES	9-21	—	97	96	102	101	1.1	Rps1k	3.0	R	—	CV
RY0819	Monsanto	9-22	—	—	92	98	97	0.8	Rps1c	3.0	R	AC	R2
AG0803	Asgrow	9-23	114	106	102	96	103	0.8	Rps1k	2.5	R	CM	RR
MN1410	Minnesota AES	9-23	101	101	92	102	100	1.4	S	2.5	S	—	CV
PB-1578NRR	Prairie Brand	9-24	—	120	114	96	104	1.5	Rps1k	3.0	R	Go	RR
AG1506	Asgrow	9-24	—	120	112	95	103	1.5	Rps1k	3.0	R	CM	RR
7154	NuTech	9-24	—	115	101	100	101	1.5	S	2.5	R	—	RR
PB-159X	PBR	9-25	—	—	106	98	98	1.5	Rps1c	3.0	R	AC	R2
AG1102	Monsanto	9-25	—	—	68	97	99	1.0	M*	2.5	R	—	R2
PB-141X	PBR	9-26	—	—	122	98	98	1.4	Rps1c	2.5	R	AC	R2
K2X16A9	Kruger	9-26	—	—	121	101	98	1.5	Rps1c	3.0	R	AC	R2

Table 9 (continued). Performance and characteristics of soybean varieties,central zone; at soybean-cyst-nematode-infested sites (Danvers, Gaylord, Grove City and Rosemount), 2007-2009.

Variety		Maturity	Yield, Percent of Mean			Percent of Mean		Maturity	Phytophthora	Chlorosis	Seed	SCN	Variety
or Brand	Originator	Date	2007-2009	2008-2009	2009	Protein	Oil	Rating	Gene	Score	Treat	Rating	Type
2814NRR	Gold Country Seed	9-26	—	—	117	97	103	0.9	Rps1c	3.0	R	—	R2
K2X15B9	Kruger	9-26	—	—	116	104	95	1.5	Rps1c	2.5	R	AC	R2
M-159NRR	Mustang	9-26	—	124	116	96	104	1.5	Rps1k	3.0	R	TX	RR
1440 EXP	Gold Country Seed	9-27	—	—	116	98	97	1.4	Rps1b	2.5	R	—	R2
7208	G2 (NuTech)	9-28	—	—	111	99	101	1.5	Rps1c	3.0	R	—	RR
7226	G2 (NuTech)	9-29	—	—	108	101	102	1.5	Rps1k	3.0	R	—	RR
7212	G2 (NuTech)	9-29	—	—	108	96	102	1.5	Rps1k	3.0	R	—	RR
7249	G2 (NuTech)	9-29	—	—	107	100	104	1.5	Rps1k	3.0	R	—	RR
Mean	—	9-23	37.7 bu/a	41.5 bu/a	43.2 bu/a	34.4%	18.1%	—	—	—	—	—	—
LSD 20%	—	—	2%	3%	6%	—	—	—	—	—	—	—	—

*M = Mixture of Rps1c and Rps1k.

Table 10. Performance and characteristics of soybean varieties, relative maturity (RM)> 1.5, central zone; at soybean-cyst-nematode infested sites (Danvers, Gaylord, Grove City and Rosemount), 2009.

Variety		Maturity	Yield, Percent of Mean			Percent of Mean		Maturity	Phytophthora	Chlorosis	SCN	Seed	Variety
or Brand	Originator	Date	2007-2009	2008-2009	2009	Protein	Oil	Rating	Gene	Score	Rating	Treat	Type
MN1011CN	Minnesota AES	9-20	—	—	89	100	98	1.0	Rps1	2.5	R	—	CV
MN1106CN	Minnesota AES	9-21	—	—	88	100	104	1.1	Rps1k	2.5	R	—	CV
MN1701CN	Minnesota AES	9-23	—	—	99	103	99	1.7	S	3.0	R	—	CV
MN1204RRCN	Minnesota AES	9-23	—	—	92	103	101	1.2	—	3.5	R	—	RR
MN1410	Minnesota AES	9-24	—	—	95	102	101	1.4	S	3.0	S	—	CV
AG1802	Asgrow	9-25	—	—	109	98	103	1.8	Rps1k	3.5	R	CM	RR
Adv 1740CR	Advantage	9-25	—	—	108	97	102	1.7	Rps1k	3.0	R	—	RR
PB-1885NRR	Prairie Brand	9-25	—	—	107	96	103	1.8	Rps1k	3.0	R	Go	RR
Adv 2106CR	Advantage	9-25	—	—	105	97	102	2.1	Rps1c	3.5	R	—	RR
7186	G2 (NuTech)	9-25	—	—	102	102	99	1.6	Rps1k	2.5	R	CM	RR
91Y80	Pioneer Brand	9-25	—	—	99	98	100	1.8	Rps1k+Rps6	2.5	R	—	RR
Freeborn	Minnesota AES	9-25	—	—	93	106	102	1.6	Rps1	3.0	R	—	CV
PB-179X	Prairie Brand	9-26	—	—	115	99	101	1.7	Rps1k	3.5	R	AC	R2
AG2108	Asgrow	9-26	—	—	111	99	99	2.1	S	3.0	R	CM	RR
M-177NRR	Mustang	9-26	—	—	110	94	104	1.7	Rps1k	3.0	R	TX	RR
92Y20	Pioneer Brand	9-26	—	—	110	97	103	2.2	Rps1k	3.5	R	—	RR
RY1709	Monsanto	9-26	—	—	107	99	98	1.7	Rps1k	3.0	R	AC	R2
PB-2058NRR	Prairie Brand	9-26	—	—	107	98	102	2.0	Rps1k	3.5	R	—	RR
RY1719	Monsanto	9-26	—	—	106	99	97	1.7	S	3.0	R	AC	R2
AG1703	Asgrow	9-26	—	—	103	97	102	1.7	Rps1k	3.5	R	CM	RR
K2-1901	Kruger	9-26	—	—	103	99	96	1.9	Rps1k	2.5	R	AC	R2
IA1022	Iowa AES	9-26	—	—	102	96	103	2.0	S	3.0	R	—	CV
Adv 2170CR	Advantage	9-26	—	—	90	102	100	2.1	Rps1k	3.0	R	—	RR
92Y30	Pioneer Brand	9-27	—	—	110	99	99	2.3	Rps1k	4.0	R	—	RR
M-209NRR	Mustang	9-27	—	—	109	97	100	2.0	S	3.5	R	TX	RR
RY2409	Monsanto	9-27	—	—	108	96	99	2.4	Rps1c	2.5	R	AC	R2
K2X16A9	Kruger	9-27	—	—	106	100	99	1.6	Rps1k	3.5	R	AC	R2
PB-2099NR2	Prairie Brand	9-27	—	—	106	96	100	2.0	Rps1c	4.0	R	AC	R2
IA2068	Iowa AES	9-27	—	—	99	99	96	2.1	S	3.0	R	—	CV
K2X19B9	Kruger	9-27	—	—	96	102	98	1.9	Rps1c	4.0	R	AC	R2
Adv 2214R	Advantage	9-27	—	—	92	99	102	1.9	Rps1c	3.0	S	—	R2
W 3244NR2	Wensman Seed	9-28	—	—	112	99	98	2.4	Rps1c	3.5	R	—	R2
PB-201X	PBR	9-28	—	—	109	101	98	2.0	Rps1c	4.0	R	—	R2
1808RN	NuTech	9-28	—	—	106	98	102	1.8	Rps1c	3.0	R	—	RR
7225	NuTech	9-28	—	—	104	102	99	2.2	S	3.5	R	—	RR
92Y10	Pioneer Brand	9-28	—	—	102	99	96	2.1	Rps1k	2.5	R	—	RR
7201	NuTech	9-28	—	—	98	96	103	2.0	Rps1c	3.0	R	—	RR
W 3212NR2	Wensman Seed	9-29	—	—	106	96	102	2.2	Rps1c	3.0	R	—	R2
K2-2101	Kruger	9-29	—	—	104	97	102	2.1	Rps1c	3.0	R	AC	R2
K2X21A9	Kruger	9-29	—	—	104	106	94	2.1	—	3.0	S	AC	R2
7216	NuTech	9-29	—	—	103	100	99	2.1	S	3.0	R	—	RR
IA2094	Iowa AES	9-29	—	—	102	101	100	2.6	S	3.0	R	—	CV
RY2419	Monsanto	9-29	—	—	101	103	91	2.4	Rps1k	3.0	R	AC	R2
M190NRR	Mustang	9-29	—	—	101	99	99	1.9	Rps1c	4.5	R	TX	RR

Table 10 (continued). Performance and characteristics of soybean varieties, relative maturity (RM)> 1.5, central zone; at soybean-cyst-nematode infested sites (Danvers, Gaylord, Grove City and Rosemount), 2009.

Variety or Brand	Originator	Maturity Date	Yield, Percent of Mean 2007-2009	2008-2009	2009	Percent of Mean Protein	Oil	Maturity Rating	Phytophthora Gene	Chlorosis Score	SCN Rating	Seed Treat	Variety Type
7199	NuTech	9-29	—	—	97	101	102	1.9	Rps1c	3.5	R	CM	RR
Adv 2353R	Advantage	9-29	—	—	96	104	97	2.0	Rps1k	3.0	S	—	RR
7203	AgSource	9-29	—	—	91	106	94	2.0	S	4.0	R	—	RR
3229L	AgSource	9-29	—	—	85	106	94	2.2	S	2.5	R	—	LL
Adv 2207R	Advantage	10-1	—	—	95	101	97	2.0	S	3.0	R	—	RR
3248L	AgSource	10-2	—	—	82	103	106	2.4	Rps1k	3.0	R	—	LL
Mean	—	9-26	—	—	46.7 bu/a	34.3%	18.0%	—	—	—	—	—	—
LSD 20%	—	—	—	—	6%	—	—	—	—	—	—	—	—

Table 11. Performance and characteristics of soybean varieties,southern zone; at soybean-cyst nematode-infested sites (Gaylord, Lamberton, Waseca and Westbrook), 2007-2009.

Variety or Brand	Originator	Maturity Date	Yield, Percent of Mean 2007-2009	2008-2009	2009	Percent of Mean Protein	Oil	Maturity Rating	Phytophthora Gene	Chlorosis Score	SCN Rating	Seed Treat	Variety Type
MN1011CN	Minnesota AES	9-15	90	89	92	100	98	1.0	Rps1	2.5	R	—	CV
MN1106CN	Minnesota AES	9-16	—	90	90	100	104	1.1	Rps1k	3.0	R	—	CV
MN1204RRCN	Minnesota AES	9-19	—	88	87	103	102	1.2	—	4.0	R	—	RR
MN0908CN	Minnesota AES	9-19	—	—	85	102	100	0.9	S	3.5	R	—	CV
MN0902CN	Minnesota AES	9-19	—	—	83	104	96	0.9	Rps1k	2.5	R	—	CV
Freeborn	Minnesota AES	9-20	93	95	97	105	99	1.6	Rps1	3.0	R	—	CV
MN1410	Minnesota AES	9-20	93	92	95	101	102	1.4	S	2.5	S	—	CV
92Y20	Pioneer Brand	9-21	—	100	99	97	103	2.2	Rps1k	3.0	R	—	RR
MN1701CN	Minnesota AES	9-21	97	98	95	101	100	1.7	S	3.5	R	—	CV
AG1703	Asgrow	9-22	—	—	99	98	103	1.7	Rps1k	3.0	R	CM	RR
IA1022	Iowa AES	9-22	101	102	98	95	105	2.0	S	3.0	R	—	CV
AG1802	Asgrow	9-22	107	103	96	100	103	1.8	Rps1k	2.5	R	CM	RR
M-209NRR	Mustang	9-23	—	105	105	99	101	2.0	S	2.5	R	TX	RR
AG2107	Asgrow	9-23	103	102	102	100	103	2.1	Rps1k	3.0	R	CM	RR
PB-1885NRR	Prairie Brand	9-23	104	100	99	98	103	1.8	Rps1k	3.0	R	Go	RR
PB-2058NRR	Prairie Brand	9-23	—	101	98	100	102	2.0	Rps1k	2.5	R	AC	RR
IA1020	Iowa AES	9-23	—	—	98	100	93	1.9	—	3.5	R	—	CV
7216	NuTech	9-23	—	101	94	99	101	2.1	S	3.0	R	—	RR
Adv 2170CR	Advantage	9-23	—	—	90	99	101	2.1	Rps1k	2.5	R	—	RR
Adv 2214R	Advantage	9-23	—	—	90	97	103	1.9	Rps1c	3.0	S	—	R2
IA2073	Iowa AES	9-23	—	—	87	100	96	2.1	—	2.5	R	—	CV
MN1804CN	Minnesota AES	9-23	—	—	76	99	100	1.8	Rps1c	2.5	R	—	CV
7208	G2 (NuTech)	9-24	—	—	113	100	101	1.8	Rps1c	3.0	R	CM	RR
RY2409	Monsanto	9-24	—	—	110	97	102	2.4	Rps1c	3.5	R	—	R2
PB-1999NR2	Prairie Brand	9-24	—	—	109	101	98	1.9	Rps1k	2.5	R	AC/Go	R2
92Y30	Pioneer Brand	9-24	—	110	107	101	100	2.3	Rps1k	3.0	R	—	RR
1808RN	NuTech	9-24	—	—	107	99	100	1.8	Rps1c	2.5	R	—	RR
7201	NuTech	9-24	—	111	106	98	105	2.0	Rps1c	2.5	R	—	RR
7222	AgSource	9-24	104	104	105	96	104	2.2	Rps1k	3.0	R	—	RR
AG2108	Asgrow	9-24	108	108	104	99	101	2.1	S	3.0	R	CM	RR
K2-1901	Kruger	9-24	—	—	103	101	99	1.9	Rps1k	2.5	R	AC	R2
K2-2101	Kruger	9-24	—	—	101	98	103	2.1	Rps1c	2.5	R	AC	R2
K2X19B9	Kruger	9-24	—	—	100	103	98	1.9	Rps1c	3.0	R	AC	R2
K2X21A9	Kruger	9-24	—	—	100	104	96	2.1	—	2.5	S	AC	R2
7249	G2 (NuTech)	9-24	—	—	100	98	101	1.8	Rps1k	3.0	R	CM	RR
IA2068	Iowa AES	9-24	98	97	96	95	101	2.1	S	4.0	R	—	CV
7212	G2 (NuTech)	9-25	—	—	110	97	104	1.8	Rps1k	3.0	R	CM	RR
RY2419	Monsanto	9-25	—	—	109	104	90	2.4	Rps1k	2.5	R	—	R2
Adv 2202CR	Advantage	9-25	—	—	108	98	103	2.2	Rps1c	3.0	R	—	R2
W 3212NR2	Wensman Seed	9-25	—	—	108	98	103	2.2	Rps1c	2.5	R	CM	R2
M190NRR	Mustang	9-25	—	—	108	101	100	1.9	Rps1c	3.5	R	TX	RR
PB-2099NR2	Prairie Brand	9-25	—	—	106	99	102	2.0	Rps1c	3.0	R	—	R2
7226	G2 (NuTech)	9-25	—	113	106	99	104	1.8	Rps1k	2.5	R	CM	RR
2140	Gold Country Seed	9-25	—	—	106	97	103	2.1	Rps1c	2.5	R	—	R2

Table 11 (continued). Performance and characteristics of soybean varieties,southern zone; at soybean-cyst nematode-infested sites (Gaylord, Lamberton, Waseca and Westbrook), 2007-2009.

Variety or Brand	Originator	Maturity Date	Yield, Percent of Mean 2007-2009	2008-2009	2009	Percent of Mean Protein	Oil	Maturity Rating	Phytophthora Gene	Chlorosis Score	SCN Rating	Seed Treat	Variety Type
Adv 2106CR	Advantage	9-25	—	—	105	96	106	2.1	Rps1c	3.5	R	—	RR
PB-201X	PBR	9-25	—	—	103	105	97	2.0	Rps1c	2.5	R	AC	R2
7199	NuTech	9-26	—	—	105	101	98	1.9	Rps1c	3.5	R	—	RR
Adv 2353R	Advantage	9-26	—	—	98	102	98	2.0	Rps1k	3.0	S	—	RR
7203	AgSource	9-27	—	—	119	107	94	2.0	S	2.5	R	—	RR
W 3244NR2	Wensman Seed	9-27	—	—	113	102	97	2.4	Rps1c	2.5	R	CM	R2
3229L	AgSource	9-27	—	—	111	106	95	2.2	S	2.5	R	—	LL
M-259NRR	Mustang	9-27	—	—	106	97	99	2.4	Rps1k	3.0	R	TX	RR
Adv 2207R	Advantage	9-27	—	—	104	101	98	2.0	S	3.0	R	—	RR
3248L	AgSource	9-30	—	—	113	98	99	2.4	Rps1k	3.0	R	—	LL
Mean	—	9-23	41.8 bu/a	42.9 bu/a	47.8 bu/a	34.2%	18.3%	—	—	—	—	—	—
LSD 20%	—	—	2%	3%	6%	—	—	—	—	—	—	—	—

Table 12. Characteristics of special-use soybean varieties, northern zone; Crookston, Moorhead and Shelly, 2009.

Variety or Brand	Originator	Maturity Rating	Special Characteristics	Hilum Color	Phytophthora Gene	Chlorosis Score	Seeds/Lb.	Seed Treat	Variety Type
07005	Thunder	0.05	Tofu	Yellow	—	3.0	2,508	—	CV
MN0071	Minnesota AES	00.7	General Purpose	Brown	Rps1	2.5	2,892	—	CV
OT05-20	Meridian Seeds	0.9	Tofu	Yellow	—	2.5	2,009	AX	RR
Cavalier	No. Dakota AES	00.7	General Purpose	Yellow	Rps6	2.5	2,508	—	CV
OT05-21	Meridian Seeds	0.7	Tofu	Yellow	—	3.0	2,009	AX	RR
MN0096SP	Minnesota AES	00.9	Higher Protein	Yellow	S	2.5	2,752	—	CV
MN0105	Minnesota AES	0.1	General Purpose	Yellow	Rps1c	3.0	2,686	—	CV
MN0107	Minnesota AES	0.1	General Purpose	Yellow	Rps1k	2.5	3,027	—	CV
TA8	Thunder	0.4	Natto	Yellow	—	3.0	4,540	—	CV
MN0095	Minnesota AES	0.0	General Purpose	Imperfect Black	Rps1	2.5	3,880	—	CV
MN0082SP	Minnesota AES	00.8	Small Seed	Yellow	Rps1	2.5	5,405	—	CV
MN0093SP	Minnesota AES	00.9	Small Seed	Grey	Rps1	3.0	4,882	—	CV
MN0306SP	Minnesota AES	0.3	Large Seed	Black	Rps1	3.0	2,131	—	CV
MN0094SP	Minnesota AES	00.9	Large Seed, Higher Protein	Black	Rps1	2.5	1,983	—	CV
TA10	Thunder	0.5	Natto	Yellow	—	3.0	4,989	—	CV
MN0104SP	Minnesota AES	0.1	Large Seed, Higher Protein	Black	Rps1	3.0	2,215	—	CV
MN0207SP	Minnesota AES	0.2	Small Seed	Yellow	Rps1	2.5	6,486	—	CV
MN0103SP	Minnesota AES	0.1	Small Seed	Yellow	Rps1	3.0	5,896	—	CV
MN0307SP	Minnesota AES	0.3	Large Seed	Yellow	Rps1c	3.5	2,259	—	CV
MN0605SP	Minnesota AES	0.6	Higher Protein	Buff	Rps1c	3.0	2,838	—	CV
MN0403SP	Minnesota AES	0.4	Small Seed	Yellow	Rps1	3.0	6,053	—	CV
MN0303SP	Minnesota AES	0.3	Small Seed	Yellow	Rps1	3.0	5,675	—	CV

Table 13. Performance of special-use soybean varieties, northern zone; Crookston, Moorhead and Shelly, 2007-2009.

Variety or Brand	Originator	Maturity Date	Yield, Percent of Mean 2007-2009	2008-2009	2009	Percent of Mean Protein	Oil
07005	Thunder	9-22	—	110	116	97	102
MN0071	Minnesota AES	9-22	103	99	104	95	105
OT05-20	Meridian Seeds	9-25	—	—	109	101	97
Cavalier	No. Dakota AES	9-25	—	89	84	97	102
OT05-21	Meridian Seeds	9-25	—	—	82	102	100
MN0096SP	Minnesota AES	9-26	98	87	82	111	95
MN0105	Minnesota AES	9-28	—	101	106	103	99
MN0107	Minnesota AES	9-30	—	118	132	98	101
TA8	Thunder	9-30	—	—	82	100	96
MN0095	Minnesota AES	10-3	99	121	127	94	109
MN0082SP	Minnesota AES	10-4	96	99	97	97	104
MN0093SP	Minnesota AES	10-5	109	111	112	93	109
MN0306SP	Minnesota AES	*	96	92	108	101	101
MN0094SP	Minnesota AES	*	—	96	97	104	99
TA10	Thunder	*	—	—	83	100	99
MN0104SP	Minnesota AES	*	104	93	81	105	98

Table 13 (continued). Performance of special-use soybean varieties, northern zone; Crookston, Moorhead and Shelly, 2007-2009.

Variety or Brand	Originator	Maturity Date	Yield, Percent of Mean 2007-2009	2008-2009	2009	Percent of Mean Protein	Oil
MN0207SP	Minnesota AES	*	95	94	94	95	98
MN0103SP	Minnesota AES	*	88	89	90	96	104
MN0307SP	Minnesota AES	*	109	100	106	102	107
MN0605SP	Minnesota AES	*	107	104	115	114	88
MN0403SP	Minnesota AES	*	—	—	80	101	96
MN0303SP	Minnesota AES	*	94	96	99	97	99
Mean	—	10-3	33.7 bu/a	34.1 bu/a	33.9 bu/a	35.8%	16.9%
LSD 20%	—	—	3%	4%	7%	—	—

* Variety not mature at killing frost.

Table 14. Characteristics of special-use soybean varieties, central zone; Becker, Morris and Rosemount, 2009.

Variety or Brand	Originator	Maturity Rating	Special Characteristics	Hilum Color	Phytophthora Gene	Chlorosis Score	Seeds/Lb.	Variety Type
MN0603SP	Minnesota AES	0.6	Small Seed	Yellow	Rps1	2.5	5,896	CV
MN0701	Minnesota AES	0.7	General Purpose	Yellow	Rps1	3.5	2,735	CV
MN0302	Minnesota AES	0.3	General Purpose	Buff	Rps1k	2.5	3,068	CV
MN0501SP	Minnesota AES	0.5	Small Seed	Yellow	Rps1	2.5	3,914	CV
MN0805SP	Minnesota AES	0.8	Small Seed	Yellow	Rps6	3.0	4,935	CV
MN0605SP	Minnesota AES	0.6	Higher Protein	Buff	Rps1c	3.0	2,752	CV
MN1203SP	Minnesota AES	1.2	Small Seed	Yellow	—	3.0	4,204	CV
MN0803SP	Minnesota AES	0.8	Higher Protein	Yellow	—	2.5	4,633	CV
MN1012SP	Minnesota AES	1.0	Small Seed	Yellow	Rps1	3.0	5,605	CV
Surge	Minn. & S.D. AES	0.9	General Purpose	Imperfect Black	Rps1	2.5	2,428	CV
MN0102SP	Minnesota AES	0.1	Small Seed	Yellow	Rps1	3.0	4,935	CV
MN0804SP	Minnesota AES	0.8	Higher Protein	Yellow	Rps1	2.5	2,873	CV
Sheyenne	No. Dakota AES	0.7	General Purpose	Yellow	Rps1c	2.5	2,785	CV
O.1692	Viking	1.6	Organic Feed	Yellow	S	2.5	2,987	CV
MN0907	Minnesota AES	0.9	General Purpose	Yellow	Rps1k+Rps6	2.5	2,624	CV
MN1309SP	Minnesota AES	1.3	Higher Protein	Black	Rps1	2.5	2,365	CV
MN0903SP	Minnesota AES	0.9	Large Seed, Higher Protein	Yellow	Rps1	4.5	2,609	CV
MN1401BL	Minnesota AES	1.4	Black Seed Coat	Black	Rps1	2.0	2,402	CV
MN1101SP	Minnesota AES	1.1	Large Seed, Higher Protein	Yellow	Rps1	2.5	2,121	CV
Vital	Falk's Seed Farm	1.1	Large Seed	Yellow	Rps1	2.5	2,236	CV
MN1410	Minnesota AES	1.4	General Purpose	Buff	S	3.0	2,820	CV
MN1104SP	Minnesota AES	1.1	Higher Protein	Yellow	Rps1	2.0	2,293	CV
MN0807SP	Minnesota AES	0.8	Higher Protein	Yellow	S	2.5	2,987	CV
MN1503SP	Minnesota AES	1.5	Higher Protein	Yellow	Rps1	2.5	2,293	CV

Table 15. Performance of special-use soybean varieties, central zone; Becker, Morris and Rosemount, 2007-2009.

Variety or Brand	Originator	Maturity Date	Yield, Percent of Mean 2007-2009	2008-2009	2009	Percent of Mean Protein	Oil
MN0603SP	Minnesota AES	9-13	71	65	62	96	98
MN0701	Minnesota AES	9-15	—	107	108	96	102
MN0302	Minnesota AES	9-16	—	97	98	94	106
MN0501SP	Minnesota AES	9-17	72	79	87	99	102
MN0805SP	Minnesota AES	9-17	86	82	83	107	90
MN0605SP	Minnesota AES	9-19	—	104	98	112	85
MN1203SP	Minnesota AES	9-19	92	88	94	93	98
MN0803SP	Minnesota AES	9-19	85	85	90	101	97
MN1012SP	Minnesota AES	9-19	—	85	85	94	97
Surge	Minn. & S.D. AES	9-20	118	120	114	97	101
MN0102SP	Minnesota AES	9-20	—	83	87	99	92
MN0804SP	Minnesota AES	9-21	111	110	104	107	88
Sheyenne	No. Dakota AES	9-22	122	120	117	94	103
O.1692	Viking	9-23	—	—	130	93	102
MN0907	Minnesota AES	9-23	—	119	122	93	110
MN1309SP	Minnesota AES	9-24	—	112	114	101	98

Table 15 (continued). Performance of special-use soybean varieties, central zone; Becker, Morris and Rosemount, 2007-2009.

Variety or Brand	Originator	Maturity Date	Yield, Percent of Mean			Percent of Mean	
			2007-2009	2008-2009	2009	Protein	Oil
MN0903SP	Minnesota AES	9-24	101	100	95	104	95
MN1401BL	Minnesota AES	9-25	—	119	117	101	113
Vital	Falk's Seed Farm	9-25	—	—	109	100	100
MN1101SP	Minnesota AES	9-25	110	109	109	105	95
MN1410	Minnesota AES	9-26	122	128	125	97	105
MN1104SP	Minnesota AES	9-26	—	—	100	100	101
MN0807SP	Minnesota AES	9-26	—	87	94	114	84
MN1503SP	Minnesota AES	9-27	111	112	112	100	103
Mean	—	9-22	38.8 bu/a	37.8 bu/a	41.6 bu/a	37.1%	17.2%
LSD 20%	—	—	2%	3%	6%	—	—

Table 16. Characteristics of special-use soybean varieties, southern zone; Lamberton, Waseca and Westbrook, 2009.

Variety or Brand	Originator	Maturity Rating	Special Characteristics	Hilum Color	Phytophthora Gene	Chlorosis Score	Seeds/Lb.	Variety Type
MN1805SP	Minnesota AES	1.8	Large Seed, Higher Protein	Yellow	Rps1	3.5	4,054	CV
MN1310SP	Minnesota AES	1.3	Low Saturates	Imperfect Black	S	2.5	2,495	CV
MN1401BL	Minnesota AES	1.4	Black Seed Coat	Black	Rps1	2.5	2,236	CV
MN1309SP	Minnesota AES	1.3	Higher Protein	Black	Rps1	2.0	2,270	CV
MN1411SP	Minnesota AES	1.4	Large Seed	Yellow	Rps1c	2.0	1,846	CV
MN1505SP	Minnesota AES	1.5	Large Seed, Higher Protein	Yellow	Rps1	3.0	2,027	CV
MN1410	Minnesota AES	1.4	General Purpose	Buff	S	2.5	2,259	CV
MN1702SP	Minnesota AES	1.7	1% Linolenic Acid	Black	—	3.0	2,655	CV
MN1503SP	Minnesota AES	1.5	Large Seed, Higher Protein	Yellow	Rps1	3.5	1,974	CV
MN1101SP	Minnesota AES	1.1	Large Seed, Higher Protein	Yellow	Rps1	2.0	1,892	CV
MN1412SP	Minnesota AES	1.4	Higher Protein	Black	Rps1c	3.0	2,551	CV
IA1022N	Iowa AES	1.8	Organic Feed	Yellow	S	2.0	2,340	CV
IA1022	Iowa AES	1.8	General Purpose	Yellow	S	2.5	2,340	CV
MN1302	Minnesota AES	1.3	General Purpose	Buff	Rps1k	2.0	1,932	CV
MN1502SP	Minnesota AES	1.5	Large Seed, Higher Protein	Yellow	Rps1	2.5	1,948	CV
RoyalPro	Northland Organic	1.6	Higher Protein Tofu Type	Yellow	S	2.0	1,753	CV
O.2078N	Viking	2.0	Organic Feed	Yellow	S	2.5	2,402	CV
MN1104SP	Minnesota AES	1.1	Higher Protein	Yellow	Rps1	2.0	1,940	CV
MN1607SP	Minnesota AES	1.6	Large Seed, Higher Protein	Yellow	Rps1	2.5	1,932	CV
MN1308SP	Minnesota AES	1.3	Large Seed	Buff	Rps1c	2.0	1,861	CV
NorthPro 7	Northland Organic	1.6	Higher Protein Tofu Type	Yellow	S	2.0	1,720	CV
MN1806SP	Minnesota AES	1.8	Higher Protein	Yellow	Rps1	2.0	1,780	CV
SurePro	Northland Organic	2.0	Higher Protein Tofu Type	Yellow	S	2.0	1,746	CV
Vinton 81	Iowa AES	2.0	Large Seed, Higher Protein	Yellow	Rps1c	2.0	1,831	CV
O.2265	Viking	2.2	Organic Feed	Yellow	S	2.5	2,565	CV
MN2001SP	Minnesota AES	2.0	Large Seed, Higher Protein	Yellow	Rps1	2.0	1,746	CV
IA3024	Iowa AES	2.6	1% Linolenic Acid	Imperfect Black	S	3.5	2,389	CV

Table 17. Performance of special-use soybean varieties, southern zone; Lamberton, Waseca and Westbrook, 2007-2009.

Variety or Brand	Originator	Maturity Date	Yield, Percent of Mean			Percent of Mean	
			2007-2009	2008-2009	2009	Protein	Oil
MN1805SP	Minnesota AES	9-14	92	83	69	110	88
MN1310SP	Minnesota AES	9-17	—	93	89	98	103
MN1401BL	Minnesota AES	9-18	—	107	109	99	114
MN1309SP	Minnesota AES	9-18	—	101	101	102	100
MN1411SP	Minnesota AES	9-18	—	88	90	101	98
MN1505SP	Minnesota AES	9-19	107	99	98	103	100
MN1410	Minnesota AES	9-20	124	116	113	98	105
MN1702SP	Minnesota AES	9-20	—	103	110	98	99
MN1503SP	Minnesota AES	9-20	110	103	108	101	100
MN1101SP	Minnesota AES	9-20	87	91	92	104	95
MN1412SP	Minnesota AES	9-20	—	85	89	114	83
IA1022N	Iowa AES	9-21	—	115	128	90	108
IA1022	Iowa AES	9-21	—	—	101	91	108
MN1302	Minnesota AES	9-21	106	99	100	101	100
MN1502SP	Minnesota AES	9-21	98	93	95	102	99
RoyalPro	Northland Organic	9-21	—	—	91	104	96
O.2078N	Viking	9-22	—	—	114	95	103
MN1104SP	Minnesota AES	9-22	—	107	108	98	103
MN1607SP	Minnesota AES	9-22	105	99	101	99	99
MN1308SP	Minnesota AES	9-22	—	99	98	101	98
NorthPro 7	Northland Organic	9-22	—	—	93	104	95
MN1806SP	Minnesota AES	9-23	—	88	85	108	94
SurePro	Northland Organic	9-24	—	—	106	106	96
Vinton 81	Iowa AES	9-24	82	88	96	104	94
O.2265	Viking	9-25	—	130	130	94	104
MN2001SP	Minnesota AES	9-27	90	83	82	107	95
IA3024	Iowa AES	9-29	—	125	128	91	103
Mean	—	9-21	40.3 bu/a	40.3 bu/a	45.1 bu/a	36.2%	17.6%
LSD 20%	—	—	2%	3%	6%	—	—

Table 18. Characteristics of publicly developed soybean varieties entered in 2009 tests.

Variety or Brand	Originator	Maturity Rating	Phytophthora Gene	BSR Reaction	SCN Reaction	Chlorosis Score	Variety Type
Cavalier	No. Dakota AES	00.7	Rps6	—	S	2.5	CV
Jim	No. Dakota AES	00.7	S	S	S	3.0	CV
MN0071	Minnesota AES	00.7	Rps1	S	S	3.0	CV
MN0095	Minnesota AES	0.0	Rps1	S	S	2.5	CV
Traill	No. Dakota AES	0.0	S	S	S	2.5	CV
MN0101	Minnesota AES	0.1	Rps1	—	S	2.5	CV
MN0105	Minnesota AES	0.1	Rps1c	—	S	2.5	CV
MN0106RR	Minnesota AES	0.1	Rps1	—	S	2.0	RR
MN0107	Minnesota AES	0.1	Rps1k	—	S	2.5	CV
MN0201	Minnesota AES	0.2	Rps1	—	S	2.5	CV
MN0208CN	Minnesota AES	0.2	Rps1	—	R	2.5	CV
MN0302	Minnesota AES	0.3	Rps1k	S	S	2.5	CV
MN0308CN	Minnesota AES	0.3	Rps1k	—	R	2.5	CV
MN0309RR	Minnesota AES	0.3	Rps1k	—	S	3.0	RR
MN0401RR	Minnesota AES	0.4	Rps1	—	S	2.5	RR
Ashtibula	No. Dakota AES	0.5	Rps1	—	S	2.5	CV
MN0502	Minnesota AES	0.5	Rps1k	—	S	2.5	CV
MN0503RR	Minnesota AES	0.5	S	—	S	3.5	RR
MN0504	Minnesota AES	0.5	Rps1	—	S	3.0	CV
MN0506RRCN	Minnesota AES	0.5	S	—	R	2.5	RR
MN0604	Minnesota AES	0.6	Rps6	—	S	3.0	CV
MN0606CN	Minnesota AES	0.6	Rps6	—	R	2.5	CV
Lambert	Minnesota AES	0.7	Rps1	S	S	2.0	CV
MN0701	Minnesota AES	0.7	Rps1	—	S	2.0	CV
Sheyenne	No. Dakota AES	0.7	Rps1c	—	S	2.0	CV
MN0806CN	Minnesota AES	0.8	S	—	R	2.5	CV
MN0902CN	Minnesota AES	0.9	S	R	R	2.5	CV
MN0903SP	Minnesota AES	0.9	Rps1	—	S	3.5	CV

Table 18 (continued). Characteristics of publicly developed soybean varieties entered in 2009 tests.

Variety or Brand	Originator	Maturity Rating	Phytophthora Gene	BSR Reaction	SCN Reaction	Chlorosis Score	Variety Type
MN0907	Minnesota AES	0.9	Rps1k+Rps6	—	S	3.5	CV
MN0908CN	Minnesota AES	0.9	S	—	R	2.5	CV
Surge	Minn. & S.D. AES	0.9	Rsp1	S	S	2.0	CV
MN1011CN	Minnesota AES	1.0	Rps1	—	R	3.0	CV
MN1013	Minnesota AES	1.0	Rps1k	—	S	2.5	CV
MN1106CN	Minnesota AES	1.1	Rps1k	—	R	3.0	CV
MN1107RR	Minnesota AES	1.1	Rps1	—	S	2.5	RR
MN1204RRCN	Minnesota AES	1.2	—	—	R	3.5	RR
MN1302	Minnesota AES	1.3	Rps1k	—	S	2.0	CV
MN1310	Minnesota AES	1.3	Rps1k	—	S	3.0	CV
MN1401	Minnesota AES	1.4	Rps1	—	S	2.5	CV
MN1410	Minnesota AES	1.4	S	R	S	2.0	CV
MN0505	Minnesota AES	1.5	Rps1k	—	S	2.5	CV
MN1504RR	Minnesota AES	1.5	Rps1k	—	S	4.0	RR
MN1506	Minnesota AES	1.5	Rps1k	—	S	2.5	CV
Freeborn	Minnesota AES	1.6	Rps1	R	R	3.0	CV
IA1021	Iowa AES	1.6	S	—	S	3.0	CV
MN1609	Minnesota AES	1.6	Rps6	—	S	4.0	CV
IA1007	Iowa AES	1.7	—	—	S	3.0	CV
MN1701CN	Minnesota AES	1.7	S	—	R	2.5	CV
MN1702SP	Minnesota AES	1.7	—	—	S	3.0	CV
MN1801	Minnesota AES	1.8	Rps1c	S	S	3.0	CV
MN1803RR	Minnesota AES	1.8	Rps1	—	S	3.0	RR
IA1008	Iowa AES	2.0	S	—	R	2.5	CV
IA1022	Iowa AES	2.0	S	S	R	3.0	CV
IA2068	Iowa AES	2.1	S	S	R	4.0	CV

Table 19. 2009 Greenhouse bioassay, and field plot test of soybean varieties, central zone, for resistance to soybean cyst nematode.

Variety or Brand	Originator	Maturity Rating	SCN Resistance Source [1]	Greenhouse Test: HG Type 0 (Race 3) FI	Greenhouse Test: HG Type 0 (Race 3) Res. [2]	Greenhouse Test: Field Egg Count Gaylord Ei	Greenhouse Test: Field Egg Count Grove City Ei	Field Reproductive Index: Gaylord (Pi = 1043) Pf/Pi	Field Reproductive Index: Grove City (Pi = 1404) Pf/Pi
AG0803	Asgrow	0.8	N	8.5	R	40.9	—	1.40	—
AG1506	Asgrow	1.5	N	8.3	R	40.4	17.6	1.38	29.61
7208	G2 (NuTech)	1.5	N	5.0	R	49.5	15.0	1.69	25.34
7226	G2 (NuTech)	1.5	N	3.8	R	53.8	27.9	3.38	1.99
7212	G2 (NuTech)	1.5	N	4.8	R	3.9	6.4	0.24	0.46
7249	G2 (NuTech)	1.5	N	10.9	MR	43.0	23.6	2.70	1.68
2814NRR	Gold Country Seed	0.9	N	7.2	R	12.0	1.2	1.08	0.11
1440 EXP	Gold Country Seed	1.4	N	4.5	R	15.5	25.0	1.38	2.24
K2X16A9	Kruger	1.5	88788	8.7	R	3.4	9.6	0.28	0.89
K2X15B9	Kruger	1.5	88788	6.9	R	62.8	20.7	5.03	1.93
RY0819	Monsanto	0.8	N	8.5	R	9.0	21.3	0.72	1.98
AG1102	Monsanto	1.0	N	9.4	R	42.6	23.0	32.58	4.92
M-159NRR	Mustang	1.5	88788	9.9	R	52.0	14.1	39.82	3.00
7154	NuTech	1.5	N	7.3	R	10.8	48.0	8.24	10.25
PB-141X	PBR	1.4	88788	6.4	R	3.4	11.1	0.25	1.10
PB-159X	PBR	1.5	88788	10.3	MR	21.5	8.0	1.56	0.79
PB-1578NRR	Prairie Brand	1.5	88788	10.0	MR	72.3	19.7	5.25	1.94
MN0308CN	Minnesota AES	0.3	88788	6.4	R	68.4	7.8	9.94	0.82
MN0606CN	Minnesota AES	0.6	88788	2.6	R	28.4	21.1	4.13	2.20
MN0806CN	Minnesota AES	0.8	88788	5.6	R	22.4	20.7	2.60	0.80
MN0902CN	Minnesota AES	0.9	88788	2.5	R	32.7	9.4	3.80	0.36
MN1011CN	Minnesota AES	1.0	88788	8.9	R	5.6	14.3	0.65	0.55
MN1106CN	Minnesota AES	1.1	209/437	22.8	MR	48.6	37.5	2.83	3.10
MN1410	Minnesota AES	1.4	S	81.2	S	90.3	123.0	5.25	10.16
Sheyenne	No. Dakota AES	0.7	S	96.5	S	109.7	77.0	6.38	6.35
MN0908CN	Minnesota AES	0.9	887/209	7.2	R	30.5	2.0	1.54	0.17
MN0506RRCN	Minnesota AES	0.5	88788	2.7	R	8.2	8.0	0.41	0.68
MN0208CN	Minnesota AES	0.2	88788	6.9	R	76.1	22.7	3.85	1.93

[1] The information of source of resistance was provided by companies. N = no data provided. 209/437 = PI209332 & or PI437654. 887/209 = PI88788 & or PI209332. S = suceptible.

[2] SCN resistance rating: R = resistant at FI 10% or less; MR = moderately resistant at FI 11-30%; LR =low resistant at FI 31-60%; S = susceptiple at FI >60%

Table 20. 2009 Greenhouse bioassay, and field plot test of soybean varieties, central zone, relative maturity (RM)>1.5, for resistance to soybean cyst nematode.

Variety or Brand	Originator	Maturity Rating	SCN Resistance Source[1]	Greenhouse Test: HG Type 0 (Race 3) FI	Greenhouse Test: HG Type 0 (Race 3) Res.[2]	Greenhouse Test: Field Egg Count Gaylord Ei	Greenhouse Test: Field Egg Count Grove City Ei	Field Reproductive Index: Gaylord (Pi = 1207) Pf/Pi	Field Reproductive Index: Grove City (Pi = 2044) Pf/Pi
Adv 1740CR	Advantage	1.7	88788	11.2	MR	33.3	19.3	1.62	0.61
Adv 2214R	Advantage	1.9	88788	54.8	LR	86.3	112.6	4.19	3.53
Adv 2353R	Advantage	2.0	88788	76.5	S	146.6	39.4	17.55	0.73
Adv 2207R	Advantage	2.0	88788	59.0	LR	178.9	131.5	21.42	2.44
Adv 2106CR	Advantage	2.1	88788	8.4	R	18.6	89.0	2.23	1.65
Adv 2170CR	Advantage	2.1	88788	4.3	R	31.9	114.2	3.82	2.12
7203	AgSource	2.0	N	3.4	R	24.0	60.6	0.42	0.90
3229L	AgSource	2.2	N	6.0	R	34.8	28.3	0.61	0.42
3248L	AgSource	2.4	N	55.1	LR	114.2	129.5	11.65	2.57
AG1703	Asgrow	1.7	N	19.1	MR	127.5	53.5	13.00	1.06
AG1802	Asgrow	1.8	N	7.1	R	9.3	104.3	0.95	2.07
AG2108	Asgrow	2.1	N	8.7	R	11.8	37.4	0.23	1.46
7186	G2 (NuTech)	1.6	N	2.0	R	9.8	46.1	0.19	1.80
K2X16A9	Kruger	1.6	88788	8.7	R	18.1	12.6	0.79	0.28
K2-1901	Kruger	1.9	88788	5.9	R	2.0	41.7	0.09	0.92
K2X19B9	Kruger	1.9	88788	7.1	R	36.8	54.7	1.60	1.21
K2-2101	Kruger	2.1	88788	12.7	MR	26.5	79.5	1.15	1.76
K2X21A9	Kruger	2.1	88788	52.6	LR	120.6	144.9	2.12	3.41
RY1709	Monsanto	1.7	N	5.8	R	41.7	35.4	0.73	0.83
RY1719	Monsanto	1.7	N	9.0	R	27.0	65.4	0.47	1.54
RY2409	Monsanto	2.4	N	9.0	R	19.1	31.5	0.34	0.74
RY2419	Monsanto	2.4	N	7.5	R	41.2	63.0	1.27	0.54
M-177NRR	Mustang	1.7	88788	9.6	R	54.9	90.6	1.70	0.78
M190NRR	Mustang	1.9	88788	8.5	R	39.2	10.2	1.21	0.09
M-209NRR	Mustang	2.0	88788	11.3	MR	41.2	27.6	1.27	0.24
1808RN	NuTech	1.8	N	15.2	MR	28.4	57.5	0.75	0.69
7199	NuTech	1.9	N	9.8	R	17.2	59.1	0.45	0.71
7201	NuTech	2.0	N	9.0	R	3.4	102.4	0.09	1.23
7216	NuTech	2.1	N	19.9	MR	47.1	50.4	1.25	0.61
7225	NuTech	2.2	N	12.2	MR	60.3	22.8	1.66	0.41
PB-201X	PBR	2.0	88788	10.7	MR	81.4	100.0	2.24	1.80
91Y80	Pioneer Brand	1.8	88788	8.0	R	6.4	25.2	0.18	0.45
92Y10	Pioneer Brand	2.1	88788	14.7	MR	152.0	74.8	4.19	1.35
92Y20	Pioneer Brand	2.2	Peking	11.3	MR	28.9	25.2	1.55	0.51
92Y30	Pioneer Brand	2.3	88788	21.1	MR	25.5	36.2	1.37	0.74
PB-179X	Prairie Brand	1.7	88788	9.7	R	25.5	61.4	1.37	1.25
PB-1885NRR	Prairie Brand	1.8	88788	16.2	MR	21.1	42.5	1.13	0.86
PB-2058NRR	Prairie Brand	2.0	88788	15.8	MR	38.2	35.4	1.24	1.52
PB-2099NR2	Prairie Brand	2.0	88788	12.6	MR	58.3	40.2	1.89	1.73
W 3212NR2	Wensman Seed	2.2	N	8.9	R	27.5	218.9	0.36	4.09
W 3244NR2	Wensman Seed	2.4	N	26.1	MR	61.3	92.9	0.81	1.74
Freeborn	Minnesota AES	1.6	88788	6.3	R	19.1	78.0	0.25	1.46
IA1022	Iowa AES	2.0	—	5.5	R	59.8	57.5	0.79	1.07
IA2068	Iowa AES	2.1	—	4.6	R	84.3	117.3	6.36	2.08
IA2094	Iowa AES		—	21.7	MR	26.0	143.3	1.96	2.54
MN1011CN	Minnesota AES	1.0	88788	8.9	R	11.8	18.5	0.89	0.33
MN1106CN	Minnesota AES	1.1	209/437	22.8	MR	68.6	68.5	5.18	1.22
MN1204RRCN	Minnesota AES	1.2	88788	3.0	R	1.0	25.2	0.02	1.12
MN1410	Minnesota AES	1.4	S	81.2	S	100.0	100.0	1.61	4.45
MN1701CN	Minnesota AES	1.7	88788	5.3	R	52.0	52.0	0.83	2.31

[1] The information of source of resistance was provided by companies. N = no data provided. 209/437 = PI209332 & or PI437654. 887/209 = PI88788 & or PI209332. S = suceptible.

[2] SCN resistance rating: R = resistant at FI 10% or less; MR = moderately resistant at FI 11-30%; LR =low resistant at FI 31-60%; S = susceptiple at FI >60%

Table 21. Greenhouse bioassay, and field plot test of soybean varieties, central zone, for resistance to soybean cyst nematode, 2009.

Variety or Brand	Originator	Maturity Rating	SCN Resistance Source[1]	Greenhouse Test: HG Type 0 (Race 3) FI	Greenhouse Test: HG Type 0 (Race 3) Res.[2]	Greenhouse Test: Gaylord Ei	Greenhouse Test: Waseca Ei	Greenhouse Test: Westbrook Ei	Field Reproductive Index: Gaylord (Pi = 766) Pf/Pi	Field Reproductive Index: Waseca (Pi = 3624) Pf/Pi	Field Reproductive Index: Westbrook (Pi = 1222) Pf/Pi
Adv 2202CR	Advantage	2.2	88788	11.3	MR	63.2	35	7.1	0.69	0.70	0.27
Adv 2106CR	Advantage	2.1	88788	8.4	R	61.8	49.1	—	0.67	0.98	—
Adv 2353R	Advantage	2.0	88788	76.5	S	113.2	84.3	7.1	12.07	1.66	0.17
Adv 2207R	Advantage	2.0	88788	59.0	LR	116.7	94.1	163.1	12.44	1.86	4.00
Adv 2170CR	Advantage	2.1	88788	4.3	R	26.4	32.9	—	2.81	0.65	—
Adv 2214R	Advantage	1.9	88788	54.8	LR	84.0	51.4	35.0	8.96	1.02	0.86
K2-1901	Kruger	1.9	88788	5.9	R	24.0	17.2	42.7	2.23	0.33	0.53
K2X19B9	Kruger	1.9	88788	7.1	R	19.4	16.5	—	1.81	0.32	—
K2-2101	Kruger	2.1	88788	12.7	MR	39.6	26.2	2.6	3.68	0.51	—
K2X21A9	Kruger	2.1	88788	52.6	LR	79.9	94.1	119.8	7.42	1.82	1.49
92Y20	Pioneer Brand	2.2	Peking	11.3	MR	9.4	31.4	11.7	0.26	1.10	0.17
92Y30	Pioneer Brand	2.3	88788	21.1	MR	79.2	45.8	—	2.24	1.60	—
PB-1885NRR	Prairie Brand	1.8	88788	16.2	MR	28.5	25.7	16.2	0.80	0.90	0.24
PB-1999NR2	Prairie Brand	1.9	88788	12.6	MR	13.9	36.5	8.4	0.39	1.28	0.13
PB-2058NRR	Prairie Brand	2.0	88788	15.8	MR	10.8	30.3	18.1	0.48	2.11	0.21
PB-2099NR2	Prairie Brand	2.0	88788	12.6	MR	41.0	32.9	19.4	1.82	2.29	0.23
PB-201X	PBR	2.0	88788	10.7	MR	31.3	8.5	9.7	1.38	0.59	0.11
7203	AgSource	2.0	N	3.4	R	21.2	26.2	—	0.94	1.82	—
3229L	AgSource	2.2	N	6.0	R	17.0	72.5	—	0.78	1.32	—
3248L	AgSource	2.4	N	55.1	LR	91.3	87.4	84.2	4.17	1.60	5.64
7222	AgSource	2.2	N	8.5	R	16.3	42.7	8.4	0.75	0.78	0.56
7208	G2 (NuTech)	1.8	N	5.0	R	10.1	47.8	8.4	0.46	0.87	0.56
7226	G2 (NuTech)	1.8	N	3.8	R	3.1	26.2	—	0.39	0.70	—
7212	G2 (NuTech)	1.8	N	4.8	R	6.6	18.3	—	0.83	0.49	—
7249	G2 (NuTech)	1.8	N	10.9	MR	24.3	36.5	7.1	3.04	0.97	0.10
7199	NuTech	1.9	N	9.8	R	30.2	27.8	12.9	3.78	0.74	0.19
1808RN	NuTech	1.8	N	15.2	MR	11.5	19.5	4.5	1.38	0.42	—
7201	NuTech	2.0	N	9.0	R	26.7	27.2	—	3.21	0.59	—
7216	NuTech	2.1	N	19.9	MR	42.0	47.3	1.3	5.04	1.02	—
W 3212NR2	Wensman Seed	2.2	N	8.9	R	13.9	33.4	11.0	1.67	0.72	0.16
W 3244NR2	Wensman Seed	2.4	N	26.1	MR	52.8	34.4	8.4	13.82	0.70	0.24
RY2409	Monsanto	2.4	N	9.0	R	13.5	28.8	—	3.55	0.59	—
RY2419	Monsanto	2.4	N	7.5	R	21.9	10	7.1	5.73	0.20	0.20
AG1703	Asgrow	1.7	N	19.1	MR	9.7	35.5	20.1	2.55	0.72	0.56
AG1802	Asgrow	1.8	N	7.1	R	5.2	28.3	5.2	0.36	0.83	0.07
AG2107	Asgrow	2.1	N	13.3	MR	24.0	30.3	—	1.64	0.89	—
AG2108	Asgrow	2.1	N	8.7	R	18.1	28.8	—	1.24	0.84	—
2140	Gold Country Seed	2.1	N	10.8	MR	26.4	23.9	—	1.81	0.70	—
M190NRR	Mustang	1.9	88788	8.5	R	3.8	18.5	3.2	0.39	0.91	—
M-259NRR	Mustang	2.4	88788	16.5	MR	12.8	39.1	9.7	1.32	1.92	0.12
M-209NRR	Mustang	2.0	88788	11.3	MR	33.0	27.2	35.6	3.39	1.34	0.42
Freeborn	Minnesota AES	1.6	88788	6.3	R	2.4	15.7	14.9	0.25	0.77	0.18
IA1020	Iowa AES		N	10.6	MR	4.2	14.9	11.0	0.21	0.59	0.11
IA1022	Iowa AES	2.0	N	5.5	R	19.1	17.2	—	0.96	0.68	—
IA2068	Iowa AES	2.1	N	4.6	R	26.0	15.7	1.3	1.32	0.62	—
IA2073	Iowa AES		N	95.7	S	114.2	78.1	85.4	5.77	3.10	0.87
MN0902CN	Minnesota AES	0.9	88788	2.5	R	16.0	24.7	12.3	0.44	0.72	0.15
MN0908CN	Minnesota AES	0.9	887/209	7.2	R	18.1	31.4	—	0.50	0.91	—
MN1011CN	Minnesota AES	1.0	88788	8.9	R	39.2	26.7	14.2	1.09	0.78	0.17
MN1106CN	Minnesota AES	1.1	209/437	22.8	MR	24.3	46.3	8.4	0.67	1.34	0.10
MN1204RRCN	Minnesota AES	1.2	88788	3.0	R	22.2	21.1	—	1.78	0.50	—
MN1410	Minnesota AES	1.4	S	81.2	S	85.8	121.9	114.6	6.86	2.91	1.65
MN1701CN	Minnesota AES	1.7	88788	5.3	R	3.1	25.7	22.7	0.25	0.61	0.33
MN1804CN	Minnesota AES	1.8	209332	11.4	MR	20.5	33.4	6.5	1.64	0.80	0.09

[1] The information of source of resistance was provided by companies. N = no data provided. IS = insufficient seed to test. 209/437 = PI209332 and/or PI437654. 887/209 = PI88788 and/or PI209332. S = susceptible.

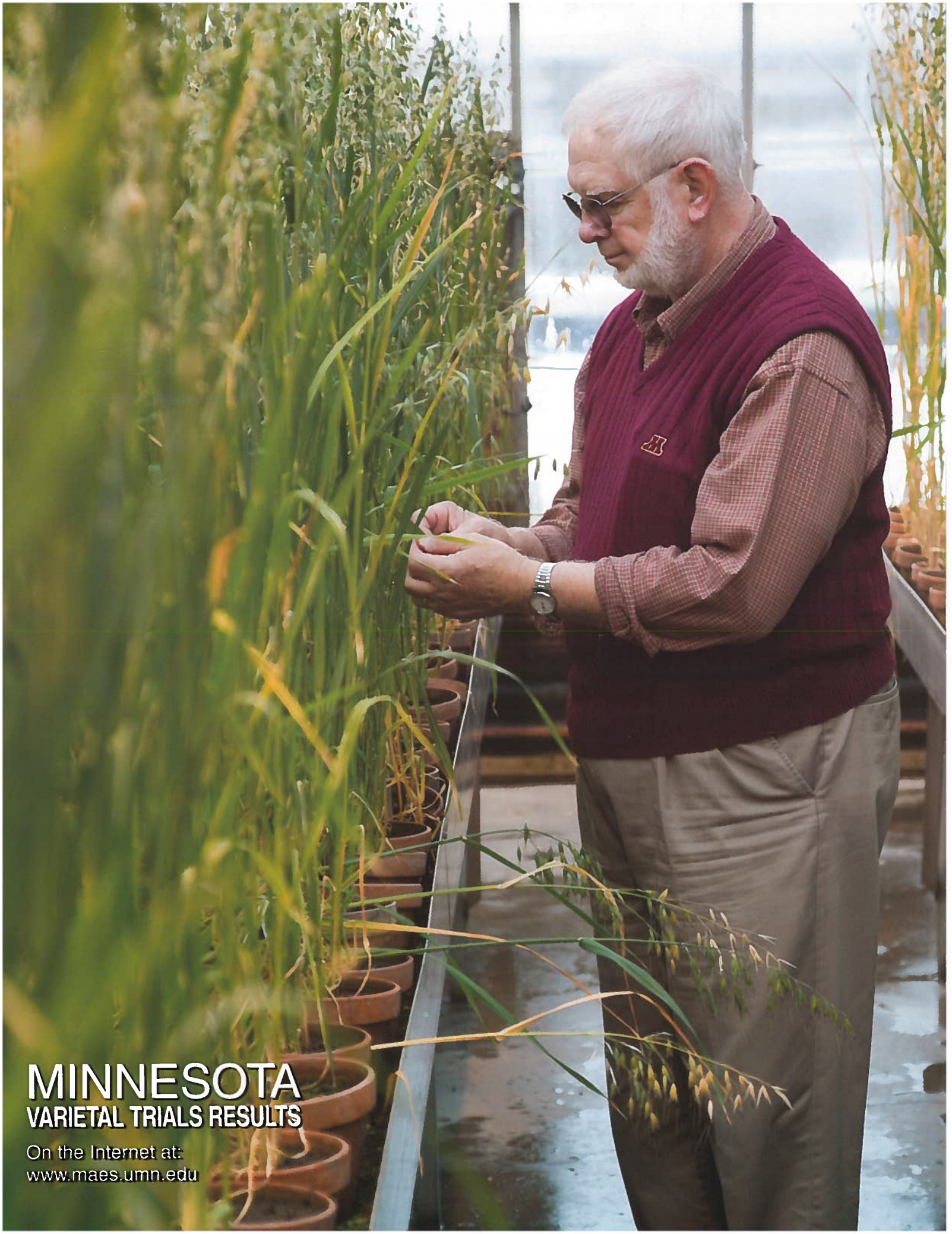
[2] SCN resistance rating: R = resistant at FI 10% or less; MR = moderately resistant at FI 11-30%; LR =low resistant at FI 31-60%; S = susceptiple at FI >60%.

Planting Rate and Date

Rates are based on seed of normal size and good quality and normal seedbed. Actual rates used will vary widely, depending on seed cost, desired stand, expected mortality, emerging ability, seed weight, seed germination, seedbed condition, depth of planting and planting equipment.

Crop	Bushel Weight (Pounds) [1]	Seeds / Pound (Number)	Rate / Acre (Pounds)	Rate (Seeds)	Planting Date
Barley	48	14,300	85	28 / sq. ft.	Early spring
Corn	56	—		33,000 / acre	April 15 / May 5
Fieldbean					
Black turtle soup	60	2,300	45	105,000 / acre	May 20 / June 15
Great northern	60	1,000	100	90,000 / acre	May 20 / June 15
Kidney	60	900	90-115	90,000 / acre	May 20 / June 15
Navy	60	2,500	42	105,000 / acre	May 20 / June 15
Navy, rows 6 to 14 in.	60		60	150,000 / acre	May 20 / June 15
Pinto	60	1,300	80	90,000 / acre	May 20 / June 15
Small red	60	1,400	75	100,000 / acre	May 20 / June 15
Small white	60	3,000	35	105,000 / acre	May 20 / June 15
Flax	56	88,000	42	85 / sq. ft.	April 15 / May 15
Forage grasses, perennial					
Bromegrass alone	14	136,000	16	50 / sq. ft.	Early spring or late summer
Bromegrass in mixtures			5	15 / sq. ft.	Use date for legumes
Orchardgrass, alone	14	653,000	10	150 / sq. ft.	Early spring or late summer
Orchardgrass, in mixtures			3	45 / sq. ft.	Use date for legumes
Reed canarygrass alone	46	526,000	7	85 / sq. ft.	Early spring or late summer
Reed canarygrass, in mixtures			5	60 / sq. ft.	Use date for legumes
Tall fescue, alone	25	229,000	15	75 / sq. ft.	Early spring or summer
Tall fescue, in mixtures			5	20 / sq. ft.	Use date for legumes
Timothy	45	1,234,000	3	85 / sq. ft.	Use date for legumes
Forage legumes, perennial					
Alfalfa alone	60	220,000	13	65 / sq. ft.	Late April-early May / Late June-early August
Alfalfa with grass			5 to 10	25 to 50 / sq. ft.	Late April-early May / Late June-early August
Alsike clover	60	653,000	2	30 / sq. ft.	Early spring to August 10
Birdsfoot trefoil alone	60	372,000	8	70 / sq. ft.	Early spring or summer
Birdsfoot trefoil in mixtures			6	50 / sq. ft.	Early spring or summer
Cicer milkvetch	60	122,000	18	50 / sq. ft.	Early spring or summer
Ladino clover	60	784,000	1	18 / sq. ft.	Early spring to August 10
Red clover alone	60	272,000	9	55 / sq. ft.	Early spring to September 1
Red clover with grass			5	30 / sq. ft.	Use date for legumes
Oat	32	16,200	80	28 / sq. ft.	Early spring
Rye	56	18,200	60	25 / sq. ft.	September 1
Sorghum, rows 18 to 40 in.	56	15,000	10	150,000 / acre	May 20 to June 5 for grain
Sorguhum, rows 6 to 14 in.			15	5 / sq. ft.	
Soybean, 7-in. rows	60	2,800	56	2 / ft. of row	May 1 to May 10
10-in. rows				3 / ft. of row	
20-in. rows				6 / ft. of row	
22-in. rows				7 / ft. of row	
30-in. rows				9 / ft. of row	
Sunflower, nonoilseed	24	4,300	4	17,000 / acre	May 1—June 15
Sunflower, oilseed	27	7,700	3	23,000 / acre	May 1—June 15
Wheat, durum	60	12,100	90	25 / sq. ft	Early spring
Wheat, hard red spring [2]	60	14,000	113	28 / sq. ft	Early spring
Wheat, hard red winter	60	14,500	75+	25 / sq. ft	August 20 / September 20
Other Crops					
Annual canarygrass	50	58,000	30	40 / sq. ft.	Early spring
Buckwheat	48	14,900	50	17 / sq. ft.	June 15 / July 20
Canola, *B napus*	50	80,000 to 160,000	3 to 5	6 to 9	Early spring
Crambe	22	65,000	15	23 / sq. ft.	Late April / early May
Fieldpea	60	2,300	180	9 / sq. ft.	Early spring
Fieldpea with 1½ to 2 bu. oat			70	4 / sq. ft.	Early spring
Fababean, medium size	60	1,300	180	5 / sq. ft.	Early spring
Fababean, with 2 bu. oat			60	2 / sq. ft.	Early spring
Lentil, small	60	15,600	55	20 / sq. ft.	Early spring
Millet, foxtail	48	218,000	15	75 / sq. ft.	June 15 / July 15
Millet, proso	56	65,000	20	30 / sq. ft.	June 15 / July 15
Sudangrass, rows 6 to 14 in.	40	44,000	25	25 / sq. ft.	May 20 / June 10
Sweetclover	60	240,000	10	55 / sq. ft.	Early spring
Wildrice (wet)	25	7,900	35	6 / sq. ft.	Late fall

[1] U.S. legal bushel weight or, if not established, the weight most widely accepted. [2] See wheat section for best way to calculate hard red spring wheat planting rate.



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